

FIRST AID

TO THE INJURED



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CPHE-CLIC

FIRST EDITION

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PRIORITY OF TREATMENT BY FIRST AIDER IN CASE OF
ACCIDENTS

FIRST AIDER

- 0 EXAMINATION & DIAGNOSIS
- 1 CARDIO PULMONARY RESUSCITATION
(EVERY SECOND COUNTS)
&
- 2 CONTROL BLEEDING
- 3 TREAT SHOCK & SPECIAL CARE OF
UNCONSCIOUS CASES
- 4 FRACTURE-(IMMOBILISATION)
- 5 BURN-COVER WITH CLEAR
WASHED/DRESSING &
TREAT SHOCK
- 6 EYE, NOSE, EAR
INJURIES
- 7 MULTIPLE
SUPERFICIAL INJURIES
- 8 TRANSPORTA-
-TION

PREFACE

This manual is offered by the St. John Ambulance Association for use by the members of the general public. Being laymen in the field of medicine(s), it is not expected of them to give to the unfortunate any treatment but to practice the basic principles of first aid & render such aid as needed by the victims till such time as medical aid arrives or he is carried to the hospital. The basic characteristic of this manual is to make the layman fully competent theoretically in the subject in a scientific method keeping in view the revolutionary changes that have emerged over the decades in modern medicine(s).

First Aid, as is known the world over has been practised ever since the inception of humanity. In India the historical evidence of rendering first aid to the wounded and sick is available in our history quoting a very few, the wars of Mahabharata, the Mughals and the Sikhs, and during the natural and man made calamities.

First Aid to the sick and wounded is what light is to the one confronted with depressing darkness. And this is the theme of the cover of this manual. Not all will be aware that Mahatma Gandhi, whom we all fondly refer to as the Father of the Nation who was the torchbearer of the struggle for freedom to our country from British rule, led a band of dedicated Ambulance Corps Volunteers in 1906 at the time of Zulu Rebellion and earlier in 1899 at the time of Boer War in South Africa, and that he himself carried the wounded General Buller to the Base Hospital. Such acts of mercy to the suffering — friend or foe — inspired the Indian Volunteers in South Africa to perform gallant deeds.

The St. John Ambulance Association is dedicating this manual to its members and to the brave volunteers of the St. John Ambulance Brigade, who, kept the torch of human kindness still glowing.

ACKNOWLEDGEMENT

A First Aid Manual reflects the experiences, convictions and the accumulated knowledge of many. It is implicit that there is nothing new in the subject matter, all of which is a part of basic First Aid knowledge and skill.

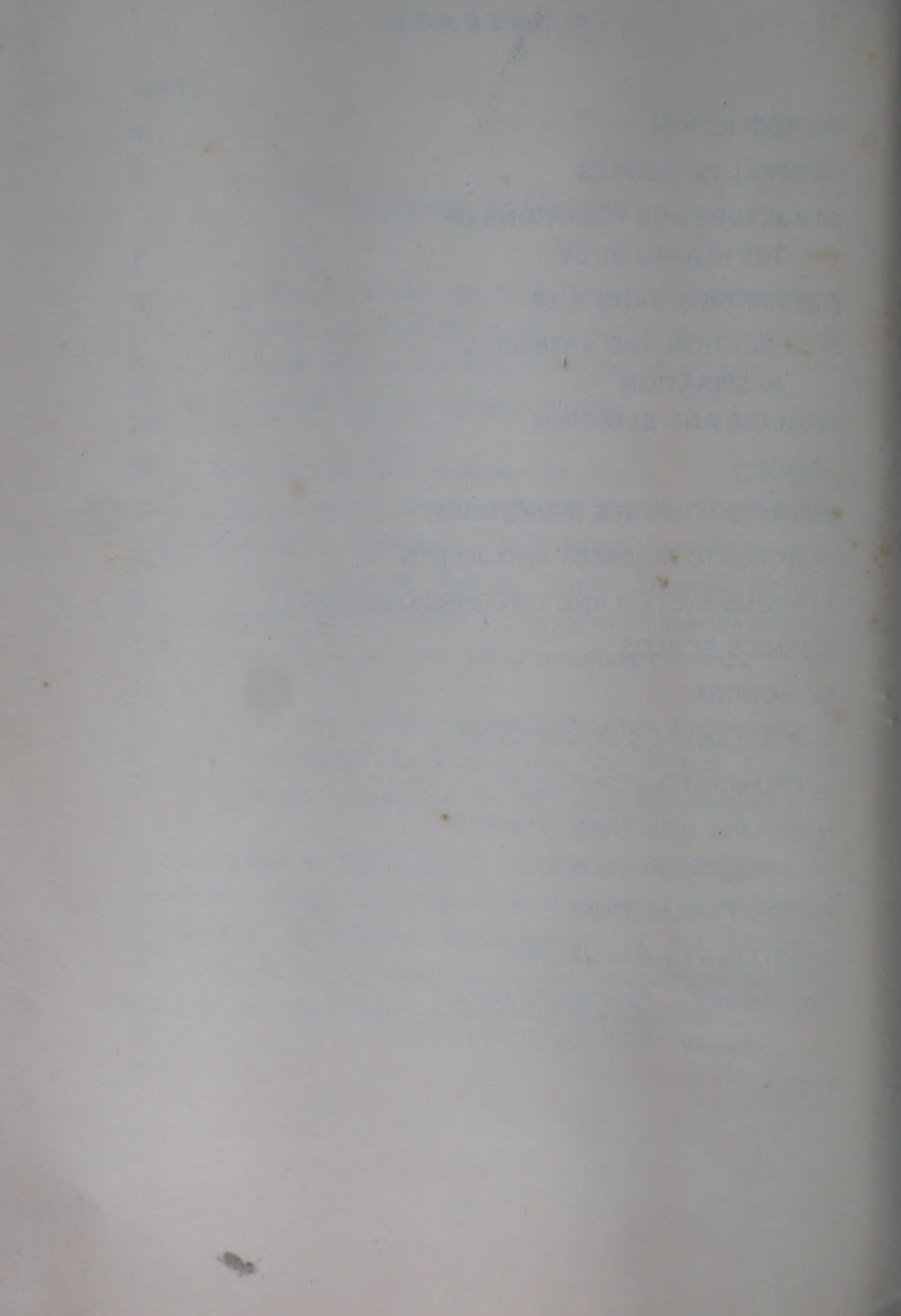
Primarily we are indebted to Dr. S. M. Chaudhri, Medical Superintendent, Kasturba Gandhi Hospital, Chittaranjan Locomotive Works, Chittaranjan (West Bengal), and to Dr. S. S. Verma, Director General, Railway Health Services, Railway Board and Surgeon-in-Chief of the St. John Ambulance Brigade, India, for sparing no pain and effort in writing this book.

We are also indebted to the many State Centres of the St. John Ambulance Association and the Brigade Districts for their valuable suggestions in compiling this Manual.

We will be failing in our duty if we do not place on record the valuable help, advice, and guidance given by the Members of the Medical Subcommittee of the Executive Committee of the St. John Ambulance Association, National Headquarters, New Delhi, in finalising this Manual.

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INTRODUCTION

Learning first-aid is a civic responsibility of each citizen. Even though methods of first-aid have been practised perhaps ever since a man desired to help another man in sickness or after injury, an organised worldwide effort at giving first-aid came only in the year 1877 with the formation of St. John Ambulance Association of England after the great apostle of St. John.

As knowledge has grown methods of first-aid have changed and now there is universal understanding on giving first-aid to people suffering from various kinds of injuries or illness. Obviously the implements to give first-aid have to be simple and available almost everywhere without notice. This also requires of the first-aider lot of innovations and versatility to use the resources available to him. The first-aider must not mistake and over play his duty of doing what is not in his domain. His job is to save and sustain life and limb till a doctor arrives or the patient is transferred to medical care.

It is also true that the methods of giving first-aid may not be generally known even to the most brilliant medical man unless he learns these. To that extent the Medical Officers may as well familiarise themselves with the methods of first-aid as without this knowledge they may find themselves helpless in dealing with a sick or an injured person outside the hospital without his usual paraphernalia.

In India we have continued to use the book on first-aid prescribed by St. John Ambulance Association of Great Britain in the year 1904. Lot of changes in the methods of giving first-aid have occurred since and it is for the first time that the St. John Ambulance Association of India has undertaken to bring out its own book on the subject.

Besides learning first-aid, it is the sacred duty of each first-aider to publicise this movement till every citizen of the country learns the methods of first-aid. This he may do in his own interest because no one knows when one will be injured

or suddenly taken ill and the other unknown man present nearby could be expected to give first-aid. Imagine the amount of security that the citizen of a country would enjoy if everyone in his country learnt first-aid.

GENERAL PRINCIPLES

1.1. First Aid is the immediate treatment given to the victim of an accident or sudden illness, before medical help is obtained.

1.2. The Aims of First Aid

First Aid has three main aims :

1. To preserve life ;
2. To promote recovery ; and
3. To prevent worsening of the casualty's condition.
4. Arrange transportation to hospital, (if necessary).

First Aid is based on scientific medicine and Surgery ; it is skilled assistance. But the First Aider is not a doctor. After the doctor takes charge the First Aider's responsibility ends. He can then stand by to help the doctor.

The First Aider should observe carefully, think clearly, and act quickly. He should be calm, cool and confident. He should not get excited. He should ask someone to call a doctor/inform hospital immediately giving some details of cases involved. While waiting for the doctor, he should give First Aid methodically.

1.3. The Scope of First Aid

1. The First Aider should examine the casualty to know the details of injuries and their nature. This is known as *Diagnosis*.
2. The Diagnosis will give him an idea of the *Treatment* to be given until the doctor takes charge.
3. The next step is to send the casualty to his house or to a hospital, as the case may be, in a suitable manner. This is known as *Disposal*.

1.3.1. *Diagnosis*

Diagnosis of a case is based on its history, signs and symptoms.

- a) History of the case is the story of the accident namely how the accident actually occurred. The casualty will give the History. If he is unconscious, someone who saw the accident will help. The surroundings will add to the information, like an abandoned scooter or a broken pillar near the place and its condition.
- b) Symptoms are what the casualty tells the First Aider — like pain, shivering, faintness etc. Pain described by the casualty will lead the First Aider to the region of injury without waste of time.
- c) Signs are what the First Aider feels and finds out for himself — like paleness, swelling of parts injured, bleeding, deformity of the limbs etc. The training the First Aider has undergone will help him make these observations correctly.

1.3.2. *Treatment*

It is in treating the casualty that the First Aider's training will come into use. The First Aider should read his book again and again lest he forgets the principles of treatment. The main ideas are:

- a) If the cause of the accident is still there, remove it, e.g., a live electric wire, pillars or logs on body etc. Or, remove the casualty from the danger, e.g., a burning house, a room with poisonous gases etc.
- b) See that the casualty is comfortable, promote recovery and see that the condition does not become worse.
- c) The following conditions require the First Aider's prompt attention: failure of breathing, stoppage of heart, severe bleeding and shock, poisoning, major burns, head injuries and fractures.
- d) Continue treatment until the doctor takes charge.

1.3.3. *Disposal*

The earlier the doctor takes charge the greater the chances of recovery.

First, take the casualty to the nearest shelter. The best, of course, is the hospital. Or it can be his house or the nearest clinic. The quickest means of transport should be made use of. A carefully worded message to the relatives, as to his condition and also to what place he is being taken, must be sent. Someone in the crowd will generally help in this. It is of course the duty of police and they are most reliable.

1.4. **Rules of First Aid**

The best advice to the First Aider is: "Make Haste Slowly."

1. Reach the accident spot quickly. This will help to save life.
2. Be calm, methodical and quick. By doing so you can lessen the pain and the effects of the injuries which may save life. Handling the casualty clumsily will only make the final recovery difficult.
3. Look for the following:
 - Is there failure of breathing?
 - Is there severe bleeding?
 - Is the shock light or severe?
- a) Attend to these and then treat easily observable injuries.
- b) Start artificial respiration, if the casualty is not breathing: it must begin at once as every second gained is helpful.
- c) Stop bleeding by pressing on the pressure point and press firmly on the bleeding area with a pad, and keep up pressing on the bleeding area for at least a few minutes (minimum 3 minutes) by watch. Take help, if needed.
- d) Treat for shock.
- e) Avoid handling the casualty unnecessarily.

4. Use the First Aid equipment, if available:—
All passenger trains, some Railway Stations, lorries and buses keep them. Make use of the material so obtained. On most occasions standard First Aid equipment will not be available. You will have to depend on the material at hand and improvise them for your requirements.
 5. Inspect the area. Take the casualty away from live wires, fallen walls beams, fire, broken gas chambers, moving machinery etc., to a safer place.
 6. Clear the crowd with nice words. Do not allow people to crowd around the casualty. The casualty needs fresh air. If a doctor is present, he will guide you. Any other First Aider must be asked to help. If otherwise take the assistance of bystanders giving them correct instructions.
 7. Note the weather. If it is fine, i.e., without rain or heat or a cold breeze, treat in the open. Otherwise move the casualty into an airy room. If no suitable house or a doctor's clinic is nearby, it is best to protect the casualty with an umbrella or a sheet of cloth or even a newspaper.
 8. Reassure the casualty. Soft words and encouraging talk will make the casualty take things easy and lie quietly. These will help recovery.
 9. Arrange for despatch to the care of a doctor, or to the hospital. At the same time intimate the relatives where the casualty is being taken to.
 10. Do not attempt too much: you are only a First Aider; give minimum assistance so that the condition does not become worse; and life can be saved.
-

STRUCTURE AND FUNCTIONS OF THE HUMAN BODY

2.1. STRUCTURE :

The skeleton forms the supporting framework of the body and consists of separate bones joined together by means of Cartilage, Ligaments and Muscles.

The parts of the Skeleton are :

1. The skull
2. The Back bone or spine
3. The Ribs and breast bone
4. The Upper Limbs
5. The Pelvis
6. The Lower Limbs bones

2.1.1. *The Skull:*

The Skull is the skeleton of the head and is made up of the following bones :

one on the top called the Dome

one in the front corresponding to the face called Frontal

two — one on either side called the Parietals

two — one on either side below the parietals — called the Temporals.

one behind corresponding to the back of the head called the Occipital

two forming the roof of the mouth or the Upper Jaw.

All these bones are joined together and form the skull. The skull contains the brain, and has bony provision for formation of eyes, ears and nose. It is rounded in shape and has an opening at the bottom through which the spinal cord enters the vertebral column. Its lower portion also forms the upper jaw. The lower jaw is a separate single bone which is attached to the skull and consists of one horizontal portion in the centre, and two vertical portions at the sides. The junction of the

vertical and the horizontal portions is commonly referred to as the angle of the jaw.

Note: Location of the Angle of Jaw

One has to be familiar with the position of the angle of

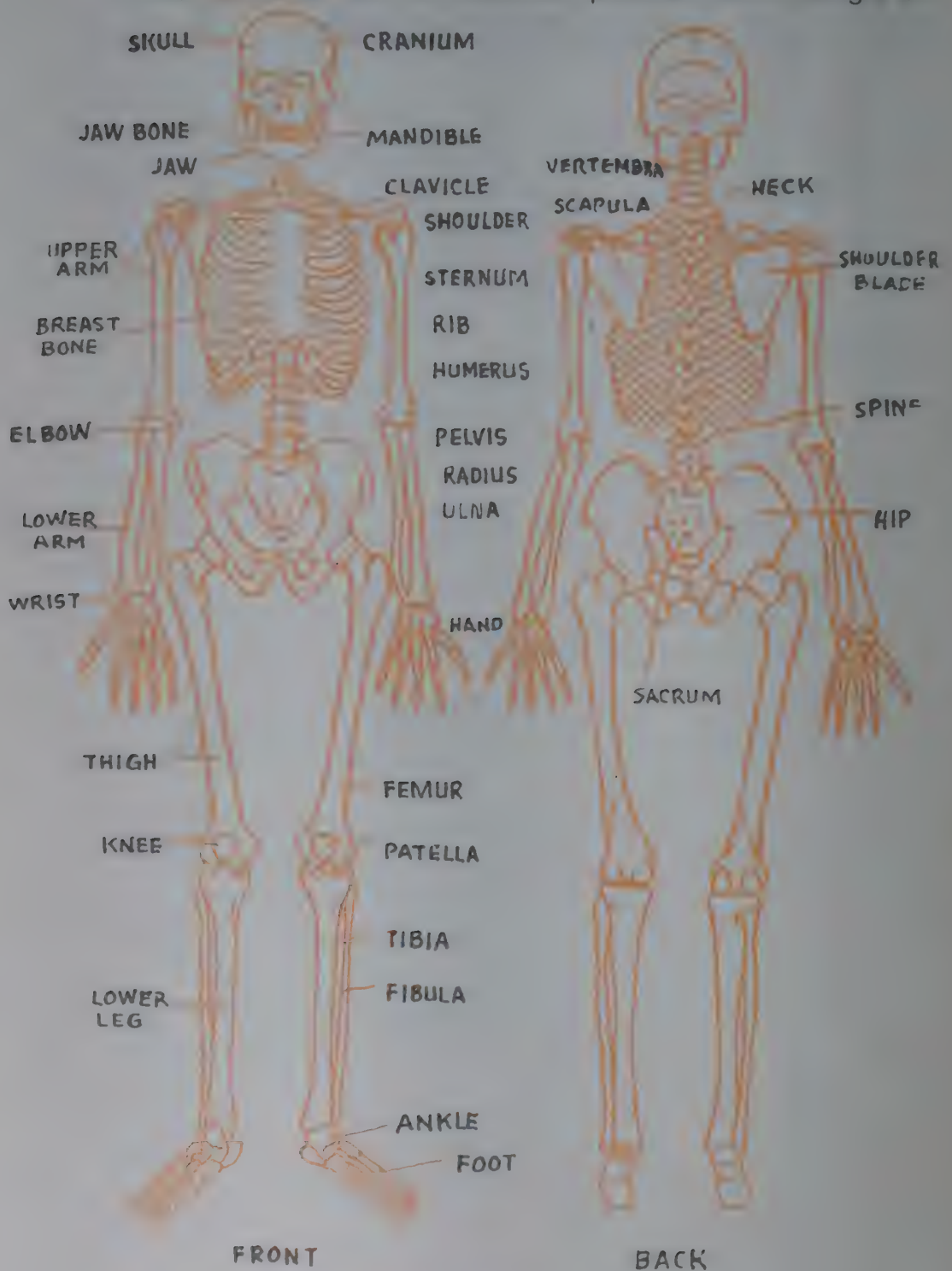


FIGURE 8 THE SKELETON

Fig. 1

the jaw because this has to be pressed forward in case of an unconscious victim to prevent the fall-back of the tongue which impedes the airway.

When a blow on the head causes bleeding from torn vessels inside the closed box of brain, the blood is unable to escape and gets collected and presses the brain tissue. This leads to headache, irritability, unconsciousness and may cause death. This dangerous development makes it important to place all persons of head injury under care of medical supervision.

2.1.2. *The Back Bone or Spine (Vertebral Column):*

It consists of thirty three small rounded pieces of bones, each called a vertebra, placed one above the other:—

7 in the Neck Region	(Cervical)
12 in the Back Region	(Thoracic or Dorsal)
5 in the Waist Region	(Lumbar)
5 in the Hip Region	(Sacral)
4 in the Tail Region	(Coccygial)

In between each vertebra, there is a thick piece of Cartilage, called "Disc" which allows movement as well as acts as a shock absorber. There is a central canal through which the spinal cord passes and carries nerve impulses to and from the brain.

If there is any injury, one vertebra may be displaced over another, thus the spinal cord is pressed or cut causing paralysis, due to interruption in the pathway of nerves.

This damage may occur immediately at the time of injury or may be caused by careless handling after the accident. It is, therefore, extremely important to handle with care all persons who have suffered severe injury to their back or neck.

2.1.3. *The Ribs & Breast Bone (Sternum):*

There are twelve pairs of ribs which are attached to the corresponding vertebrae at the back. The first seven pairs of these ribs are attached to the breastbone in front, eighth, ninth and tenth ribs are attached to the

rib above, and last two pairs of ribs, i.e. eleventh and twelfth, have no attachment in front and are known as "floating ribs". The ribs and breast bone are liable to be fractured in accidents due to either direct or indirect causes. An injury of the rib should be taken seriously and requires urgent hospitalisation.

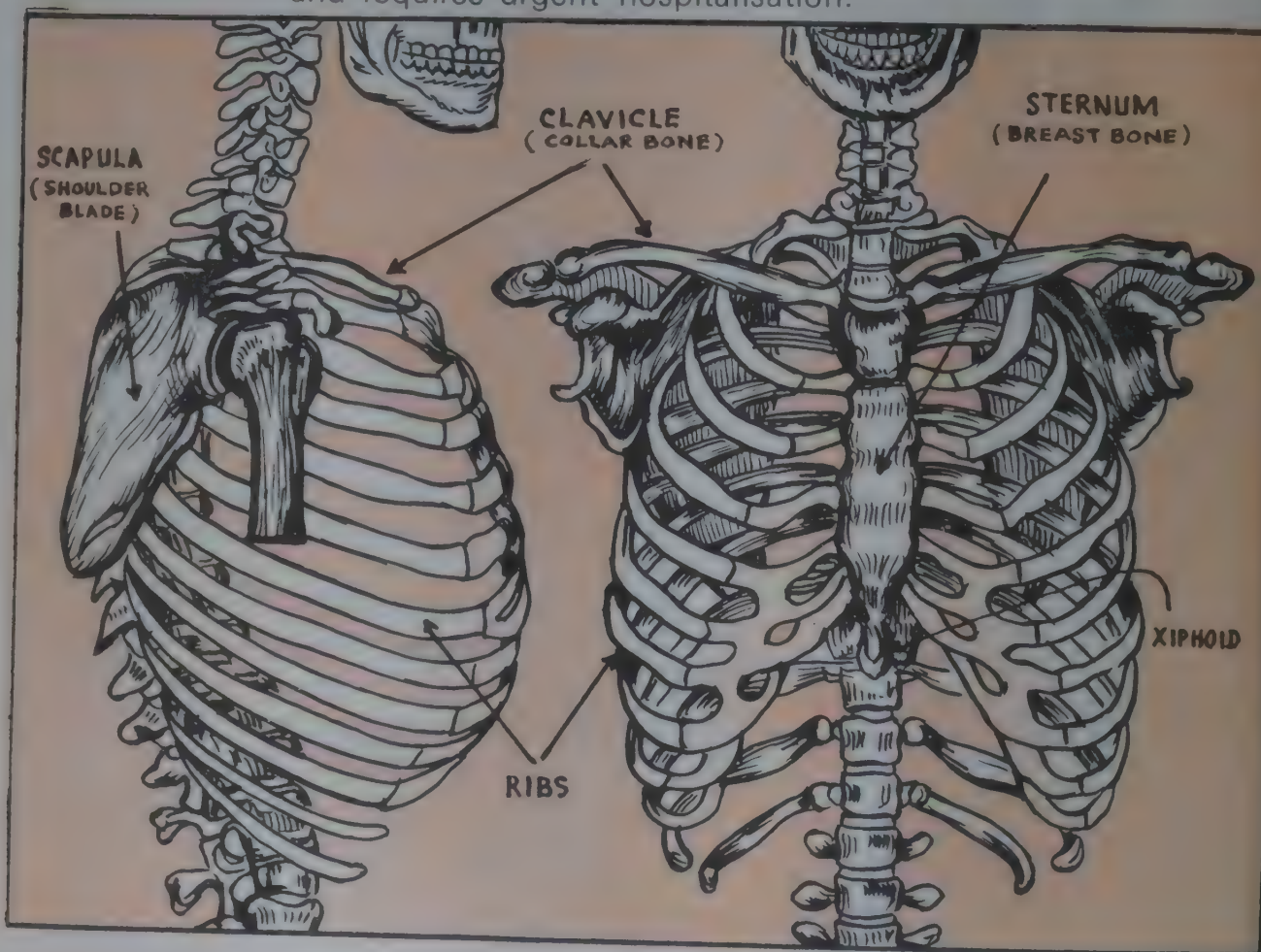


Fig. 2

2.1.4. *The Upper Limbs and Shoulder:*

The bones are (a) the collar bone (clavicle) one on each side between upper part of the breast bone on the front and shoulder joint and (b) the shoulder blade (scapula). The clavicle is a very brittle bone and is the common site of fracture. Its function is to keep away the upper limb from the chest.

2.1.5. *Shoulder Blade (Scapula):*

One on each side in the upper and outer part on the back of the chest.

The bones of the upper limbs are:—

a) Upper arm bone (humerus).

b) Forearm bones. There are two bones.

i) Radius (Outer side of forearm).

ii) Ulna (Inner side of forearm).

(The joint between upper-arm and forearm is called elbow joint).

There are 8 carpal bones at the wrist and five metacarpal

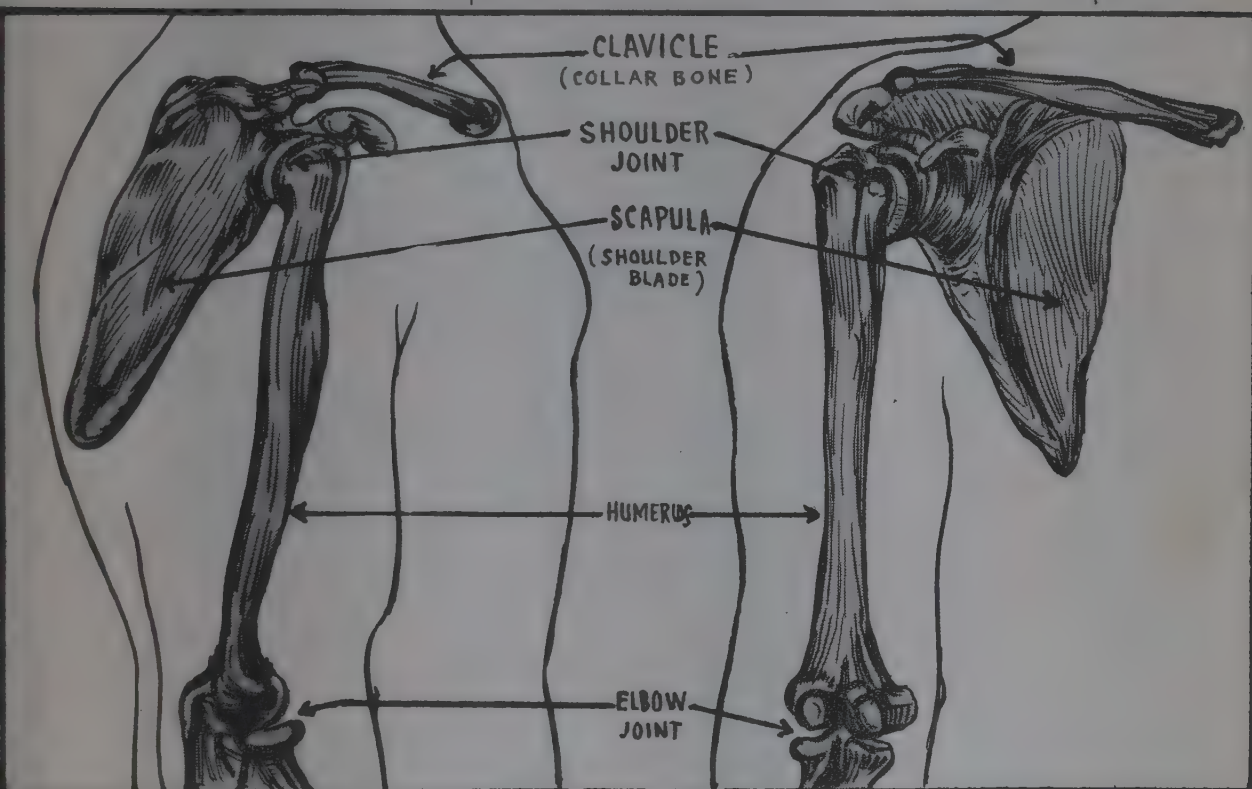


Fig. 3

bones at the palm of the hand.

There are 3 small bones in each finger called phalanges and 2 bones for each thumb.

2.1.6. *The Pelvis & Lower Limbs:*

The two hip bones joined together form the pelvis. The pelvis forms a basin-shaped cavity which contains intestines, urinary bladder and reproductive organs. There are two sockets on either side of the pelvis, where the thigh bones join, forming the hip joint.

2.2. *Femur* or the thigh bone is the longest and strongest

bone in the body. Its upper end forms a part of the hip joint while its lower end forms a part of the knee joint. The upper end of the femur is easily liable to fracture in old age due to even minor falls.

Knee cap (Patella) is a small bone over the front of the knee joint lying loosely in the muscles ligaments and under the skin.

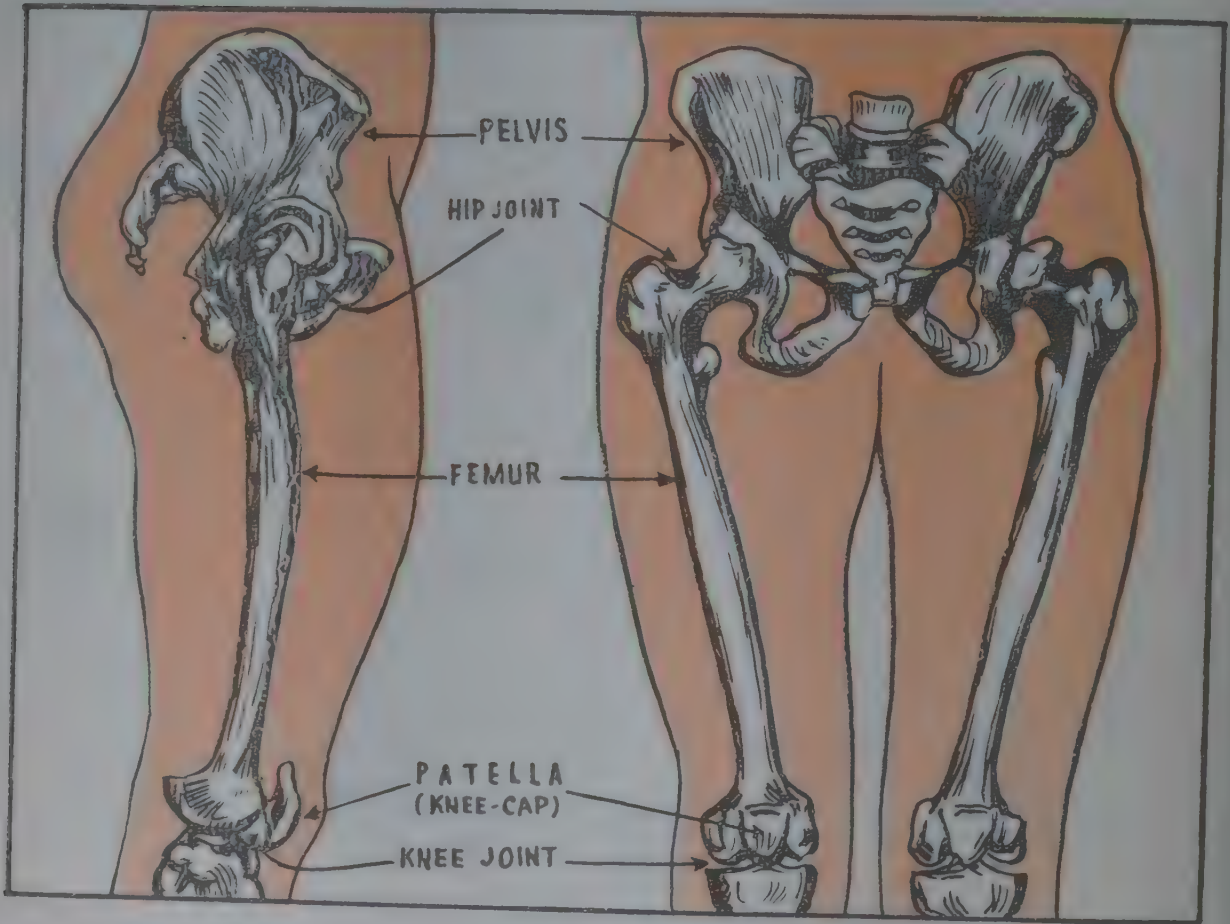


Fig. 4

The bones of the leg are the Shin Bone (Tibia) and the Brooch Bone (Fibula): The Tibia extends from the knee to the ankle, in both of which joints it plays an important part. Its sharp edge can be felt immediately beneath the skin of the front of the leg. The Fibula lies on the outer side of the Tibia. It does not enter into a formation of the knee-joint but its lower end forms the outer part of the ankle-joint.

The bones of the foot: These comprise 7 irregular bones-Tarsus at the 'instep'. The largest, the heel-

bone and the uppermost forms the lower part of the ankle-joint.

Five long bones (metatarsus) in front of the instep support the toes.

The toe bones (Phalanges) are 14 in number — two in the big toe and three in each of the other four toes.

2.3. **Joints:**

Joints are at the junction of two or more bones. There

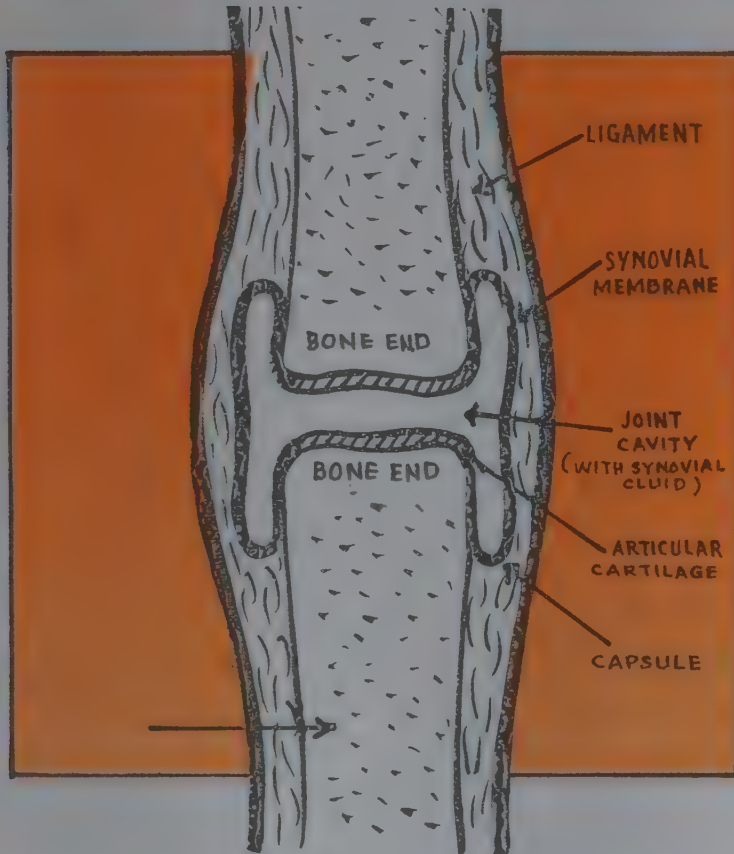
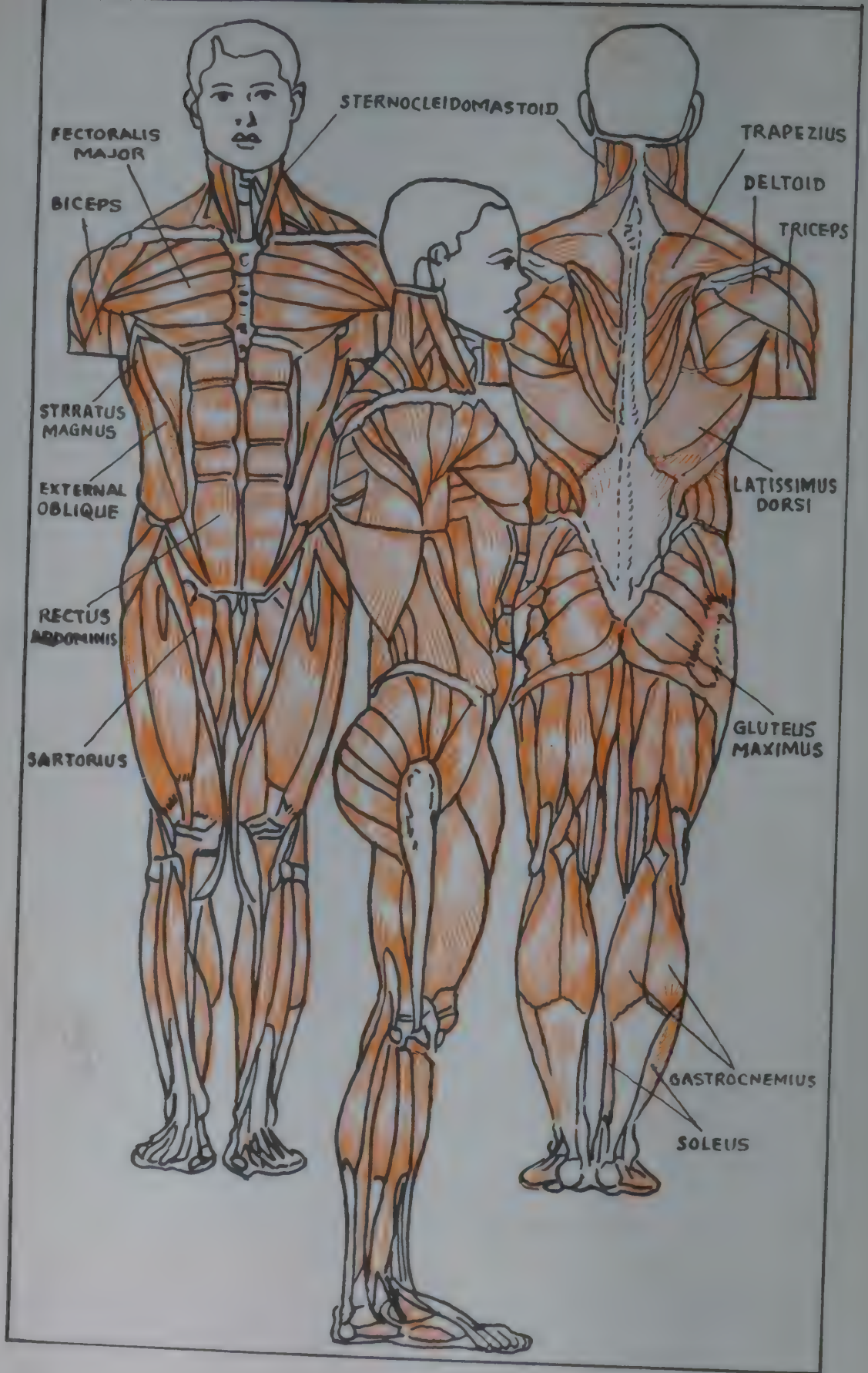


Fig. 5

may be no movement as in skull or there may be free movements as in knee, elbow, shoulder and hip joints. In movable joints, the ends of the bones are covered by cartilage and is overall again encased in capsule with some lubricant material inside the joint.

2.4 **Muscles:**

Muscles to the layman mean flesh and are primarily meant to produce movement of the limbs and organs.



There are broadly two types of muscles, viz. voluntary muscles which can cause movement under the dictates of will and involuntary muscles like those found in the heart which continue to work even without the dictates of the will.

2.5. **Nerves & Stimuli:**

The muscles go into action called contraction by stimuli of nerves arising from brain or spinal cord carrying motor impulses.

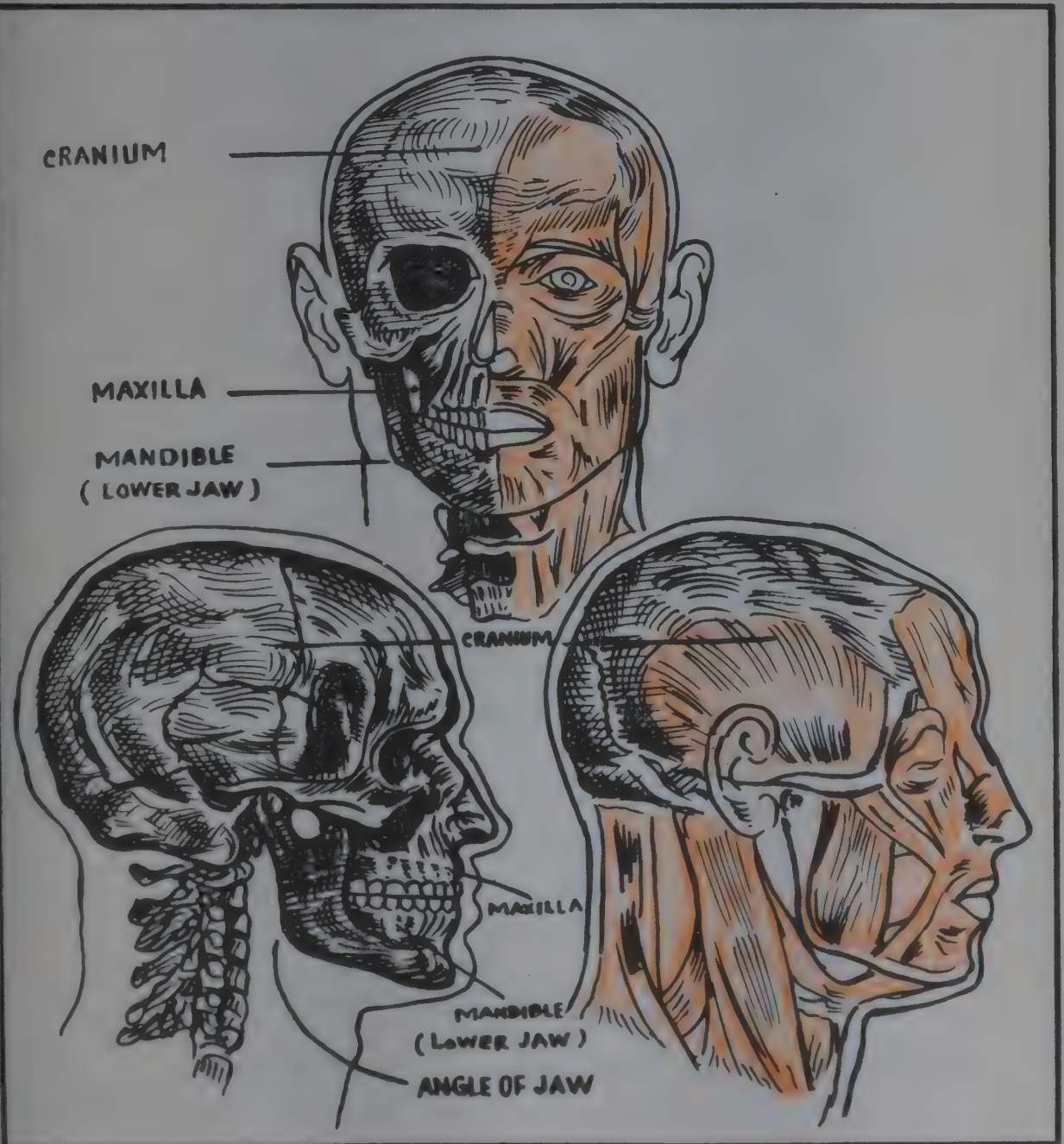


Fig. 7

The damage to the nerves results in paralysis of the muscles just as cutting the wire between a battery and the bulb, impedes the flow of electricity.

2.6. **Ligaments**

Thickened portions of a joint capsule are called ligaments. They check movements beyond normal permissible limits. If there is simple injury to the ligaments of the joints, it is called sprain.

2.7 **Connective Tissue** consists of yellow elastic and white fibrous tissue intermixed in varying proportions. It is present in many parts of the body and forms a layer between the skin and under-lying flesh all over the body, fat being contained between its meshes, often in large quantities. The chief use of connective tissue is to bind parts together.

The **Skin** covers the whole of the body and protects the under-lying structures. It consists of two layers, the outer or hard layer (cuticle) and the inner layer (true skin or dermis). In the latter are numerous glands which secrete sweat (consisting of water and impurities from the blood) the evaporation of which from the surface of the skin cools it and helps to regulate the temperature of the body.

2.8 **Heat Conservation**

The layer of fat below the skin acts as an insulator and keeps in the heat produced in the deeper parts of the body. Loss of heat from the body is prevented when necessary by cutting down the flow of blood through the skin.

2.9 **Dissipation of Heat**

The heat that is produced in the body through chemical processes and muscular contractions, as in exercise or shivering, is dissipated largely by cooling of the blood flowing in the blood vessels of the skin.

2.10 **Trunk and its Contents**

The arched muscular partition (diaphragm) divides the

trunk into two cavities—the upper, the chest (thorax), the lower (abdomen).

The upper cavity is bounded in front by the breastbone, behind by the thoracic vertebrae of the spine, below by the diaphragm, and is encircled by the ribs. It contains the heart, the lungs, major blood vessels and the gullet. The lower cavity is bounded above by the diaphragm, below by the pelvis, behind by the lumbar vertebrae and in front and at the sides by muscular walls. It contains several important organs—the liver, in the upper part of the abdomen covered mostly by the right lower ribs; the spleen, covered by the ribs on the upper part of the left side; the stomach, just below the diaphragm on the left side; the pancreas, behind the stomach; the intestines, which occupy the greater part of the cavity; the kidneys, at the back in the region of the loins; and the bladder, which lies to the front of the pelvis. Certain reproductive organs lie behind the bladder.

2.11 **Eye**

The eyes are situated in sockets in the front of the skull and are covered with folds of skin (the eyelids) from which the eyelashes project.

The inside of the eyelids and front of the eye are covered by a smooth membrane (conjunctiva) and are washed and kept moist by tear fluid.

Through the transparent part of the eye (cornea) can be seen a coloured circular diaphragm (the iris) with a round hole (the pupil). The latter varies in size with the amount of light passing through it.

Behind the pupil is the lens of the eye which focuses rays of light on to the light-sensitive part of the eye (retina).

2.12 **Ear**

The ear consists of three parts:

- a) The *outer ear* is that part which can be seen projecting from the side of the skull, together with the canal which leads to the eardrum.

- b) The *middle ear*, situated inside the skull, receives and transmits to the inner ear sound waves concerned in hearing. It also communicates with the back of the nose and throat by the Eustachian tube, which opens in swallowing.
- c) The *inner ear* is embedded inside the skull and is concerned with the sense of balance in addition to the sense of hearing.

The outer ear is separated from the middle ear by the eardrum.

2.13 **Tongue**

The tongue is the muscular organ which lies on the floor of the mouth; it assists in the tasting, mastication and swallowing of food.

In an unconscious casualty on his back, the tongue tends to obstruct the throat and prevent breathing.

FUNCTIONS OF THE BODY

The study of the normal changes and activities which go on in living beings is known as physiology.

The body consists of distinct parts such as the heart, the lungs, kidneys, etc., which carry on the special kinds of work. Such a distinct part is called an 'organ' and its special work is called a 'function'.

The essential functions of life such as respiration, circulation, digestion, excretion, etc., are carried on by a set of organs of closely related parts that form a 'system', e.g. the digestive system which includes the mouth, the gullet, the stomach, the liver, the pancreas and intestines.

The **Cells**, which compose the tissues of the body, are continually undergoing changes and become worn out, dying and being replaced. During its life a cell undergoes change and gives off carbon dioxide and other waste products and has to be supplied with food and oxygen.

Furthermore, the various chemical substances that make up the living body are continually being used up and have to be replaced by food and fluid taken into the body.

Food is digested in the mouth, stomach and intestines, by digestive juices secreted by various glands and in this way is broken down into simple substances, which are absorbed from the small intestine.

The residue, consisting largely of vegetable fibres, enters the large intestine (colon) where the accompanying water and mineral salts are absorbed.

The final waste products (faeces) are eliminated from the body through the rectum.

Oxygen is also necessary for the support of life and is obtained from the air we breathe. It must pass from the lungs into the blood stream and be circulated before it can be of use to the body. It unites with a protein in the red cells to form a suitable compound for easy transport throughout the body. Protein is a chemical compound which is derived from foodstuffs such as meat, eggs, fish etc.

The oxygen and the digested materials are carried in the blood stream to the tissues to supply substances for their growth and repair and to produce heat and energy.

2.14 **Respiration**

The object of respiration is to provide oxygen to the body and wash out carbondioxide. The oxygen

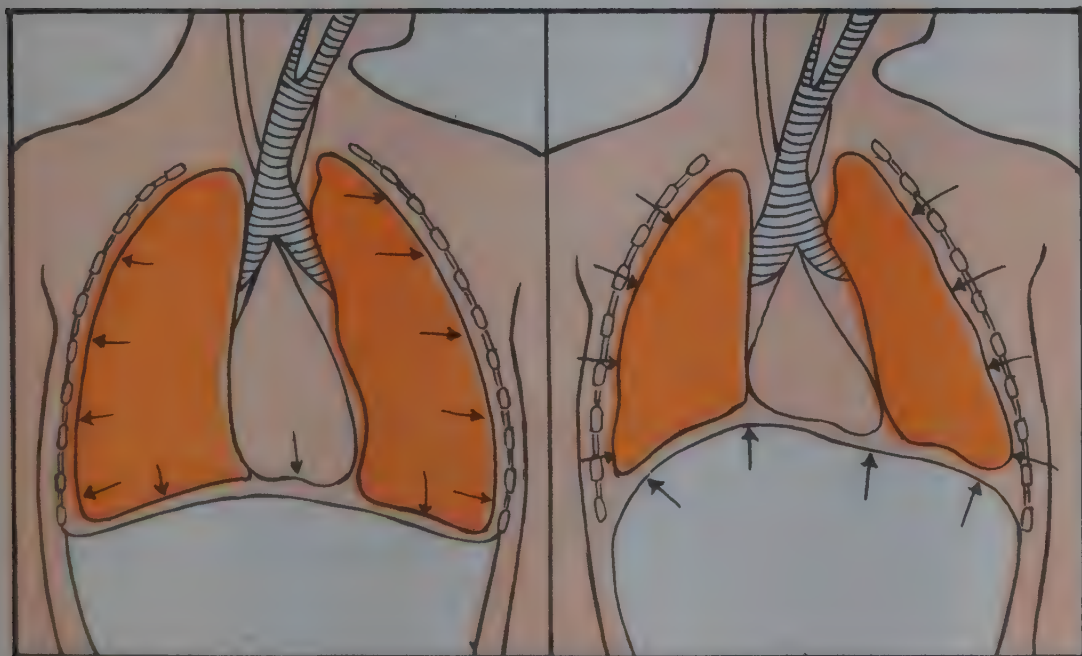


Fig. 8

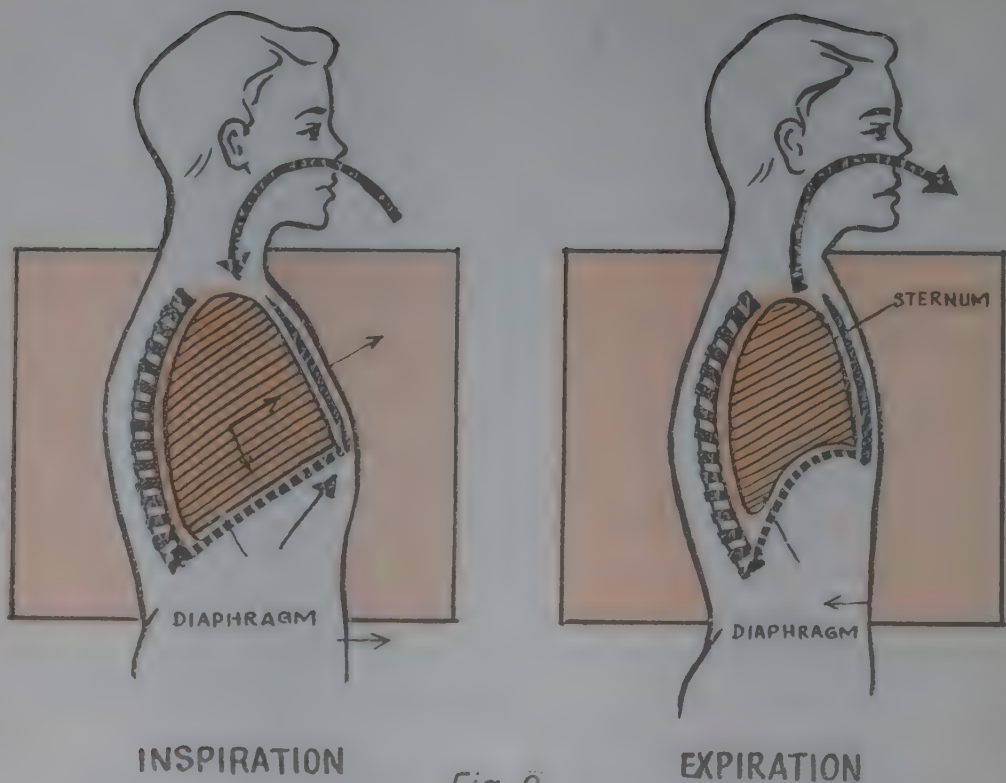


Fig. 9

provided by breathing is utilised in the combustion of end products of the digested food which, in its turn, generates carbondioxide. With each inspiration it takes in approximately 500 cc of air and gives out 500 cc of air with higher content of carbondioxide and lesser content of oxygen.

During the process of inspiration the chest cavity enlarges, creating a negative pressure, which expands the elastic lungs which are two in number and are situated in the chest cavity on either side of the heart. When the chest and or abdominal muscles relax, the chest cavity becomes smaller and the lungs go back to their normal position due to their elasticity. Interference with the respiration may therefore cause serious consequences including unconsciousness and death.

2.15 **The Heart and Circulation of Blood**

The heart is a hollow muscular organ situated at the centre of the chest cavity, between the lungs on either side. It acts as a pump. It is divided into four chambers. The right upper chamber, called the right Atrium receives impure blood from all parts of the body through

blood vessels called veins. When the heart beats this impure blood is passed into the right lower chamber, called Right Ventricle, and finally finds its way to the lungs where it is purified. During the process of purification, it gives up carbondioxide and takes a fresh quantity of oxygen. The blood so purified finds its way into the left upper chamber called left Atrium. It then passes to the left lower chamber, called Left Ventricle, and from there, in the course of the beating of the heart, the purified blood is discharged into various blood vessels called arteries and capillaries which convey this purified blood for the nourishment of the body as a whole. Thus each heart is two pumps put together.

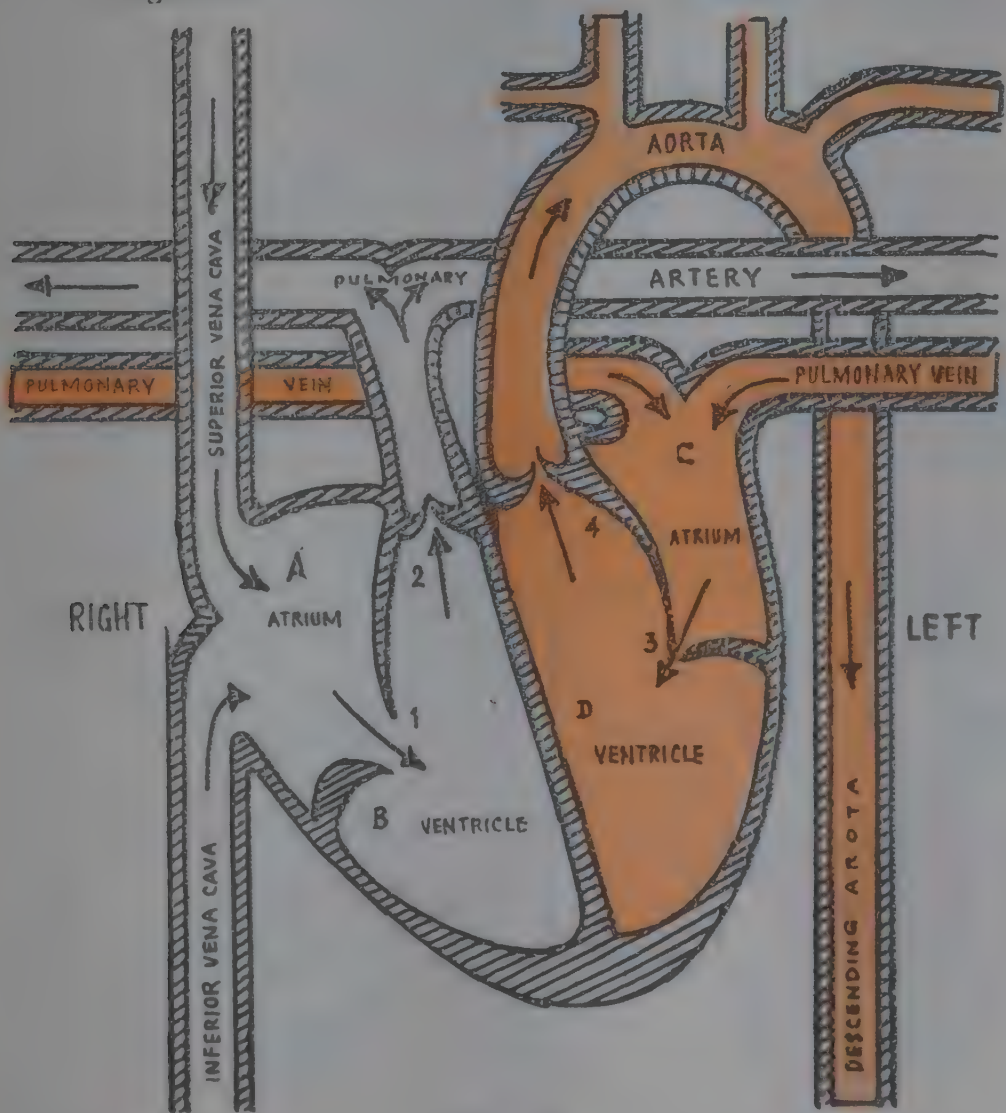
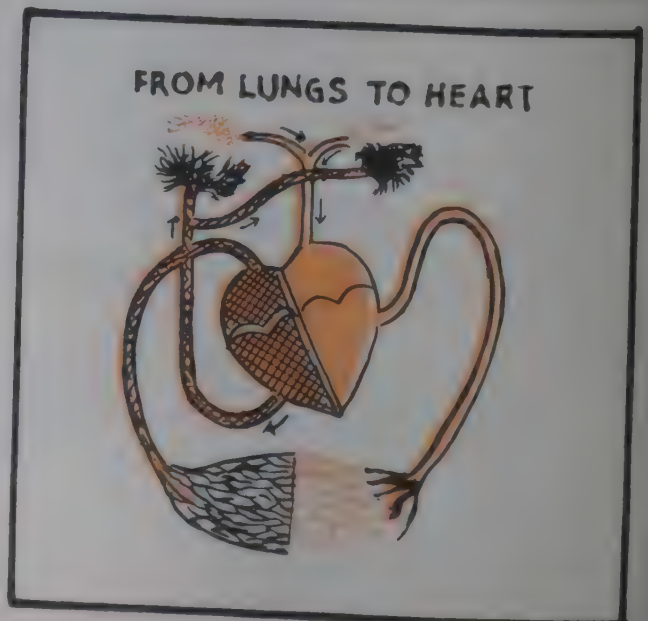
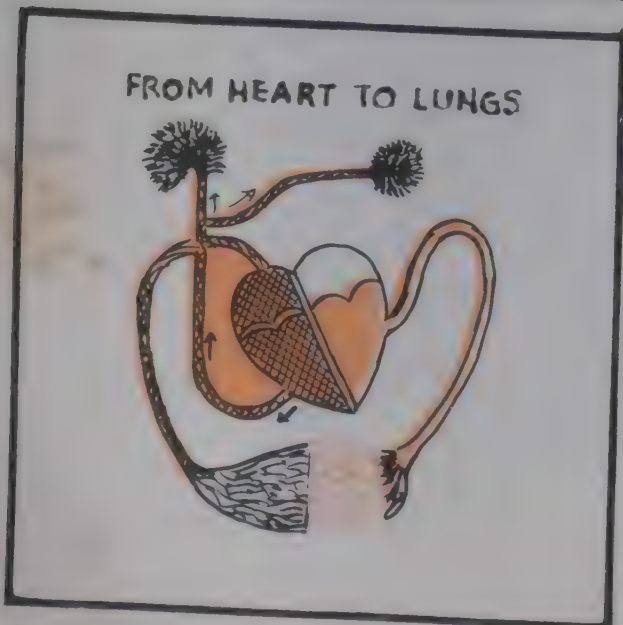
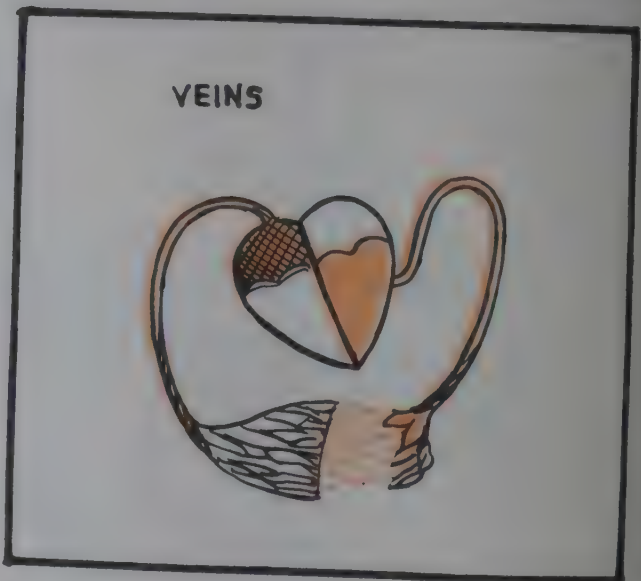
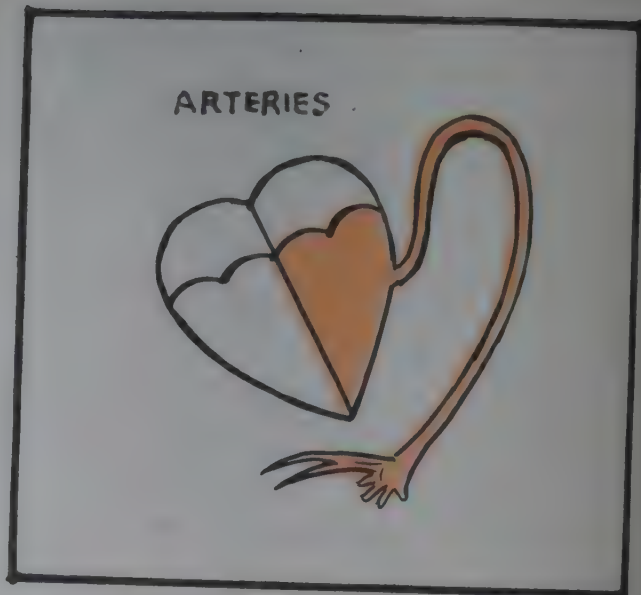
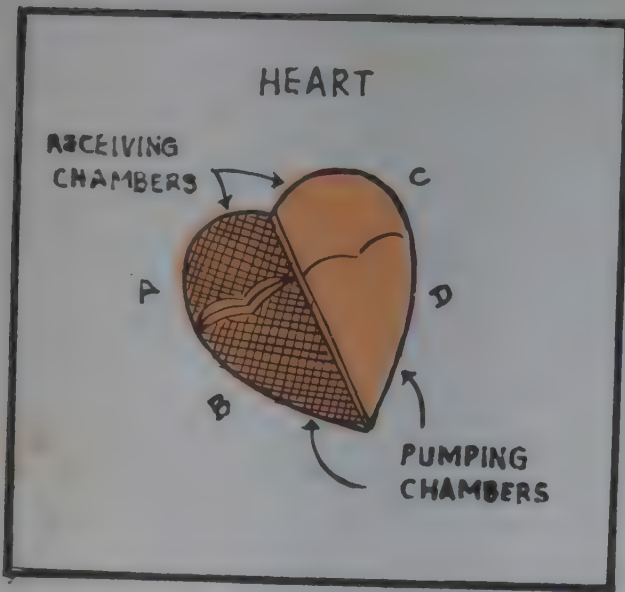


Fig. 10



The pressure in the arteries varies with the beating of the heart. When the heart contracts the pressure in the arterial system increases; when the heart relaxes, the pressure in the arteries decreases. This pressure exerted on the arteries is known as the "Blood Pressure" and is recorded by the blood pressure instrument or a rough estimate made by feeling the pulse.

2.16 **Pulse**

With each heart-beat blood is ejected into the arterial system. To accommodate this extra amount of blood the arteries expand. This expansion travels along the arteries in the form of a wave which is felt over the arteries which are accessible near the surface of the skin and is known as "Pulse".

Pulse is normally felt over the lateral side of the wrist, but can also be felt in the neck, temples, groin and near the ankle.

The average adult has a pulse rate of 72 per minute.

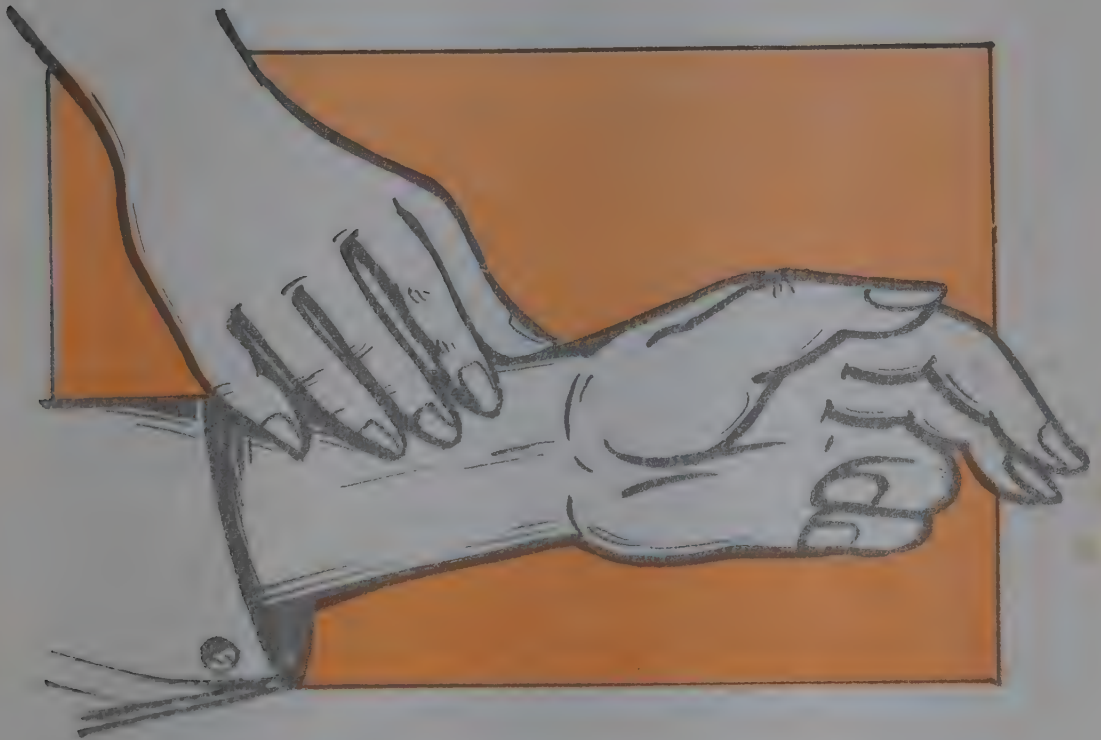


Fig. 12

2.17 **Blood**

Living human body contains widely different types of fluids. Blood is one of them. It circulates in a closed system formed by the heart, the arteries, capillaries and the veins. It is a thick viscid liquid of bright red or scarlet colour when it flows from the heart to the arteries and takes a dark red or purple hue when it comes back to the heart via the veins. It has a saline taste.

In the liquid itself are suspended varieties of cells, those which carry haemoglobin and are red in colour are known as red blood corpuscles while there are colourless corpuscles known as white blood cells. The liquid portion of the blood is normally referred to as plasma and contains proteins, enzymes and other important ingredients.

An average adult has a blood volume of five to six litres which keeps on circulating in the system and carries oxygen from the lungs to all parts of the body and collects the waste products which are partly excreted by the kidneys and the lungs. Whenever blood comes in contact with some external material it tends to solidify forming a clot to stop further bleeding. This is nature's mechanism. When the blood clots inside the arteries, veins or the heart, the clotted blood is referred to as thrombus.

2.18 **Digestion**

For the survival of human life food and water are essential. The former supplies the energy and the latter maintains the fluid balance in the system. A well-balanced diet contains proteins, carbohydrates, fats, vitamins and various minerals, viz. iron, calcium, sodium, potassium, magnesium, fluorine with traces of zinc, and copper in adequate proportions. The food at the initial stages is masticated and made into a soft pulp in the mouth which, with the aid of saliva, is passed down the gullet to the stomach in the abdomen where it undergoes further chemical changes and is finally passed into the small intestines where the enzy-

mes, bacteria and secretions from the liver, pancreas and intestines break them into various simpler compounds which are finally absorbed in the system. The unabsorbed food passes via intestines and is finally, evacuated as faeces. The chemical changes that the food undergoes from mouth downward to small intestines is normally referred to as the process of digestion.

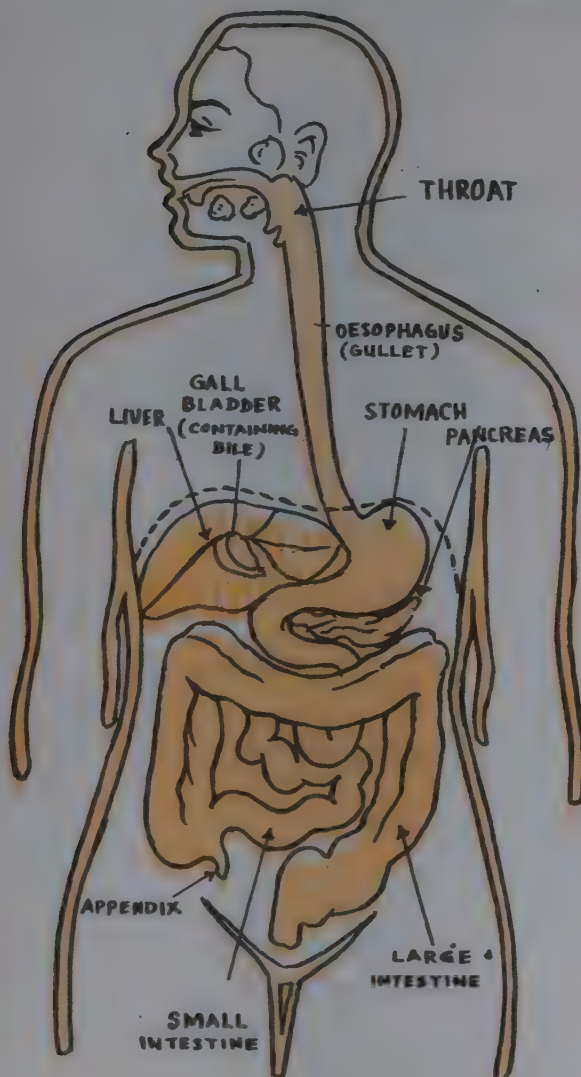


Fig. 13

2.19. **Excretion**

The waste product of the food are filtered from blood in the kidneys and excreted as urine.

There are two kidneys one on each side in the back of the abdomen. The urine passes from each kidney through ureter and is collected in the urinary

bladder which is at the central and lower part of the abdomen. Any injury on the back or lower part of the abdomen may result in damage to kidneys, ureters and or bladder.

Hence all such type of injuries are to be referred urgently to the hospital for check up and observation.

A small percentage of waste products are also excreted through respiration and perspiration.

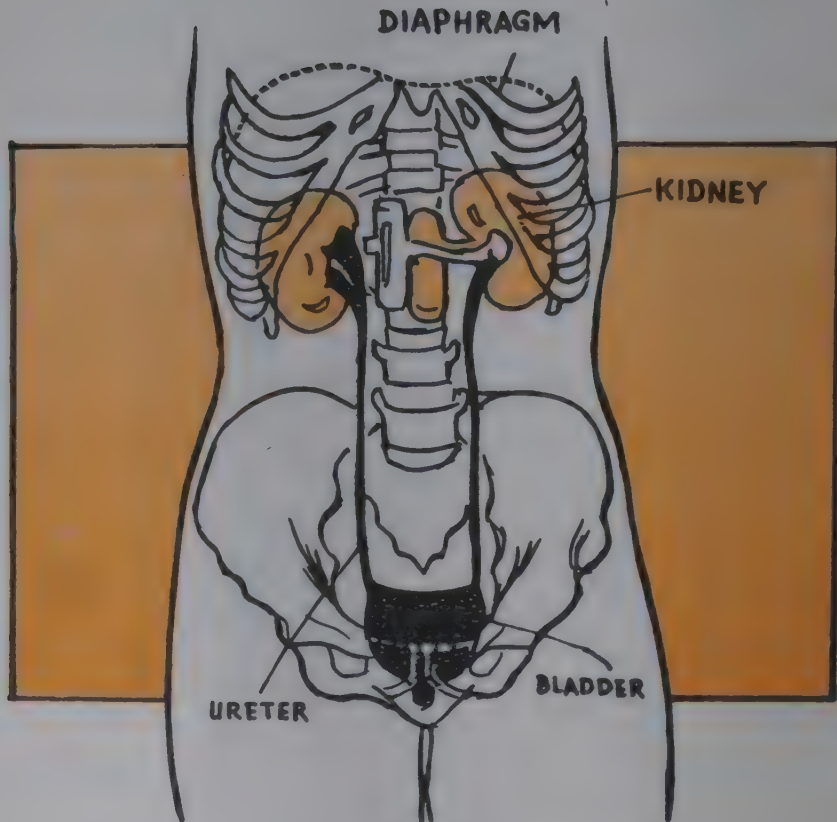


Fig. 14

DRESSINGS AND BANDAGES

3.1 DRESSINGS:

A dressing is a protective covering applied to a wound to:—

- prevent infection;
- absorb discharge;
- control bleeding;
- avoid further injury.

An efficient dressing should be sterile (germ-free) and have a high degree of porosity to allow for oozing and sweating.

3.1.1 *Adhesive Dressings*

These sterile dressings are of different kinds and consist of a pad of absorbent gauze of cellulose, held in place by a layer of adhesive material. The surrounding skin must be dry before application and all the edges of the dressing pressed firmly down. Sterile adhesive dressings are supplied in paper or plastic covers.

3.1.2 *Non Adhesive Dressings*

Readymade sterile dressing: The dressing consists of layers of gauze covered by a pad of cotton wool with an attached roller bandage to hold it in position. The dressing is enclosed and sealed in protective covering and is supplied in various sizes.

Gauze dressing: Gauze in layers is commonly used as a dressing for large wounds, as it is very absorbent, soft and pliable. It is liable to adhere to the wound; however, this may assist the clotting of blood. The dressing should be covered by one or more layers of cotton wool.

Improvised dressing: These can be from any clean soft absorbent material such as the inside of a clean handkerchief, a piece of linen, a clean paper handkerchief or cellulose tissue. They should be covered and retained in position by such materials as are available.

3.1.3 *Application of Dressings:*

Great care must be taken in handling and applying dressings. Wash your hands thoroughly.

Avoid touching any part of the wound with the fingers or any part of the dressing which will be in contact with the wound.

Do not talk or cough over the wound or the dressing. Dressing must be covered with adequate pads of cotton wool, extending well beyond them and retained in position by a bandage or strapping.

If a dressing adheres to wound do not try to remove it. Cover it with sterile dressing after cutting away whatever can be removed.

3.1.4 **BANDAGES**

These are made from flannel, calico, elastic net or special paper. They can be improvised by any of the above material, or from stockings or ties.

Bandages are used to:

- maintain direct pressure over a dressing to control bleeding;
- retain dressings and slings in position;
- prevent or reduce swelling;
- provide support for a limb or joint;
- restrict movement;
- assist in lifting and carrying casualties.

Bandages should not be used for padding when other materials are available.

Bandages should be applied firm enough to keep dressing and splints in position (but not so tight as to cause injury to the part or to impede the circulation of the blood. A bluish tinge of the finger or nails may be a danger sign that the bandages are too tight; loss of sensation is another sign.

3.2 *Types of Bandages*

There are two types of bandages:

- A. Triangular Bandages
- B. Roller Bandages.

3.2.1 Triangular Bandages

A Triangular Bandage is made by cutting a piece of calico 100 cm square from corner to corner so as to give two bandages. It has three borders. The longest is called the '*base*' and the other two the '*sides*'. There are three corners: the one opposite the base is called the '*point*' the other two are called the '*ends*'.

3.2.2 Uses of Triangular Bandages:

1. *As a whole cloth spread out fully.*

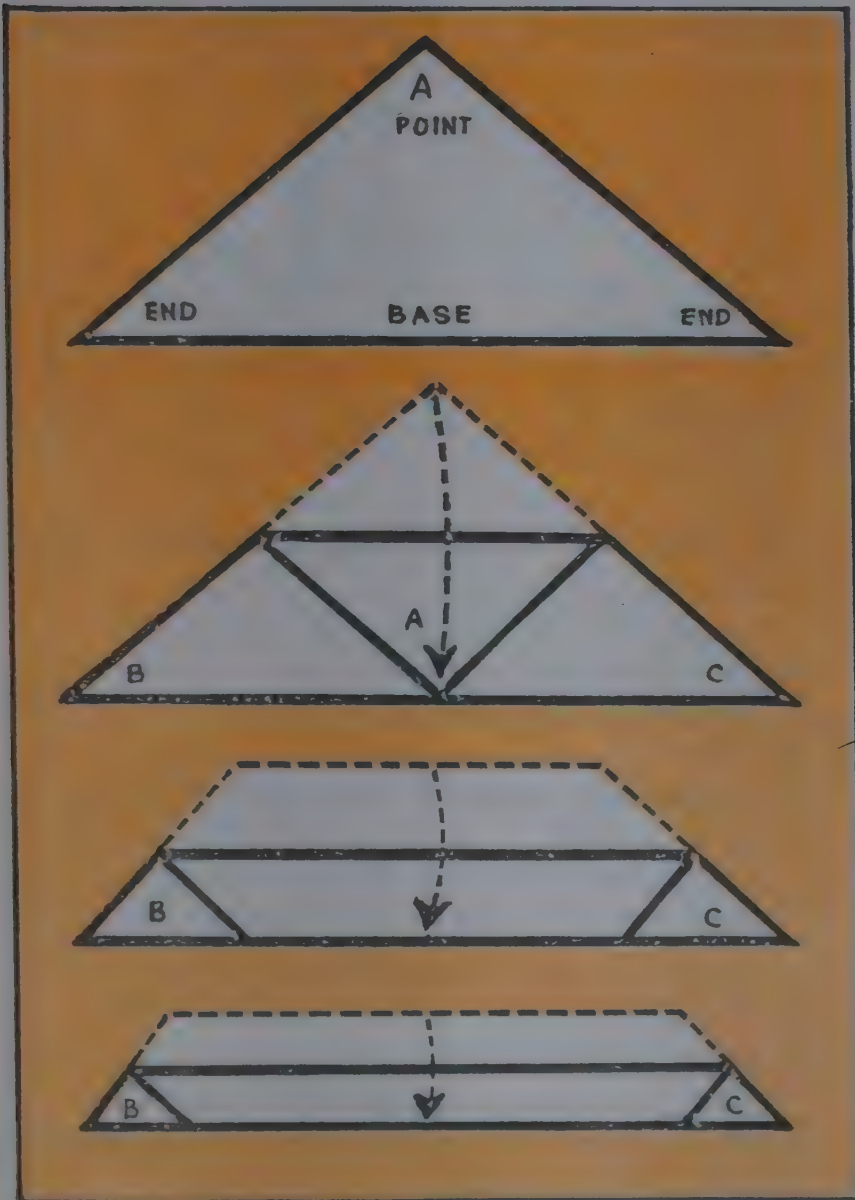
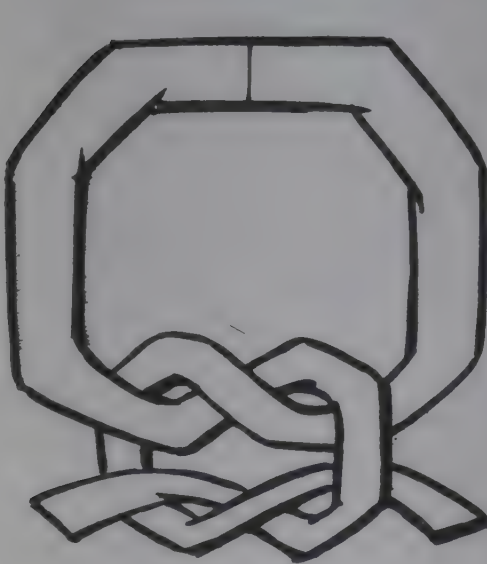
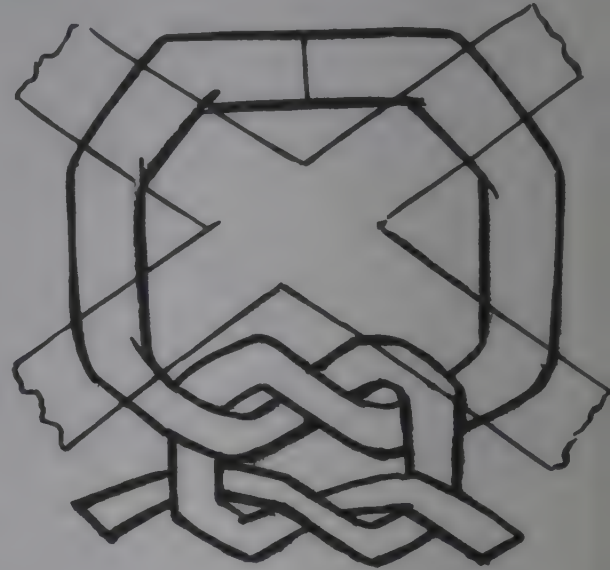


Fig. 15

2. *As a broad bandage.*
Bring the point to the centre of the base and then fold again to the same direction.
3. *As a narrow bandage*
Fold broad bandage once again.
4. When a smaller size bandage is needed fold the original so as to bring the ends together. The size is now reduced by half the original.



REEF KNOT



GRANNY KNOT

Fig. 16

3.2.3 *Tying the Bandage*

1. For tying the bandage a 'reef knot' must be always used.
To make a '*reef knot*' take the ends of the bandage one in each hand; cross the end in the right hand under and then over the end in the left hand thus making a turn. Then cross the end now in the right hand over and then under the end in the left hand, thus making a second turn. (Fig. 16).
2. The usual "*granny knot*" should not be used as it is likely to come loose.
3. The knot should be made where it does not hurt the skin or cause discomfort.
4. Tuck the loose ends of the bandage out of sight.

5. When not in use the triangular bandage should be folded narrow. Bring the two ends to the centre and fold again. It becomes a packet which measures 16 cms x 9 cms handy to carry.

3.3 Slings

3.3.1 *Uses of Slings*

1. to support injured arms, and
2. to prevent pull by upper limb of injuries to chest, shoulder and neck.

3.3.2 *Different types of slings*

The Arm Sling (Fig. 17)

The arm sling is used in cases of fractured ribs, injuries to upper limbs and in cases of fractures in the forearm, wrist and hands after application of splints or plaster-casts and bandaging.

Applying the Sling

1. Face the casualty, put one end of the spread triangular bandage over the uninjured shoulder with the point on the injured side. (Fig. 17)
2. Pass the end around the neck and bring it over the injured shoulder. The other end will now be hanging down over the chest.
3. Place the forearm horizontally across the chest and bring the hanging end up. The forearm is now covered by the bandage.
4. Tie the two ends in such a way that the forearm is horizontal or slightly tilted upwards and the knot is placed in the pit above the collar-bone.
5. Tuck the part of sling which is loose at the elbow behind the elbow and bring the fold to the front and pin it up to the front of the bandage.
6. Place the free base of the bandage in such a way that its margin is just at the base of the nail of the little finger. The nails of all the fingers should be exposed.
7. Inspect the nails to see if there is any bluish colour. A bluish colour shows that there is a dangerous tightening of splints or plasters and therefore free



Fig. 17

flow of blood is not possible.

8. If the casualty is not wearing a coat, place a soft pad under the neck portion of the sling to prevent rubbing of the skin in that place.

3.3.3 *Collar and Cuff Sling (Fig. 18)*

This sling is used to support the wrist only.

1. The elbow is bent, the forearm is placed across the chest in such a way that the fingers touch the opposite shoulder. In this position the sling is applied.
2. A clove-hitch is passed round the wrist and the ends tied in the hollow above the collar bone on the injured side. (Fig. 18).

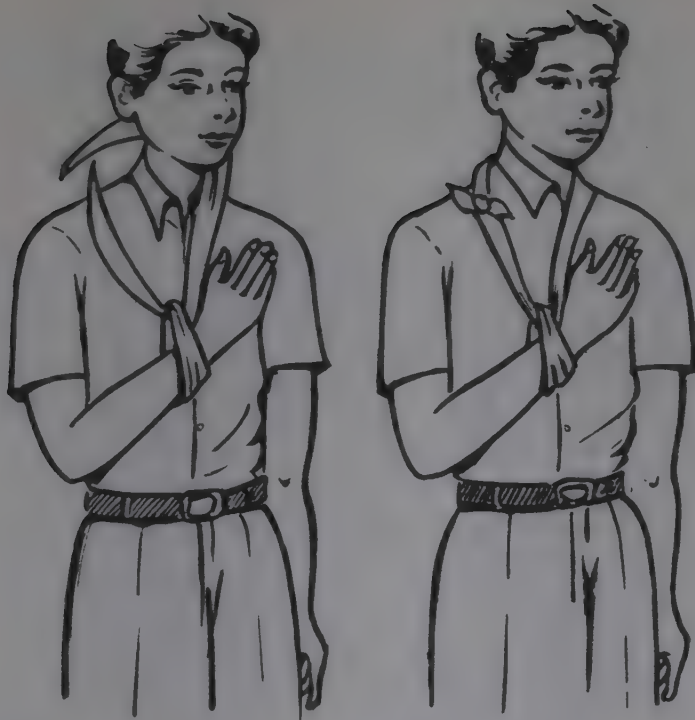


Fig. 18

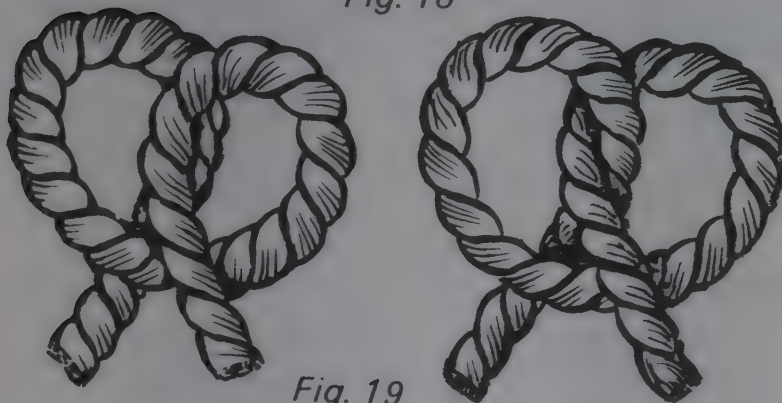


Fig. 19

Note

A *clove-hitch* is made with a narrow bandage. Two loops are made and laid one on top of the other. Next the front loop is laid behind the back loop without turning, (Fig. 19)

3.3.4 *Triangular Sling* (Figs. 20 to 22)

A triangular sling is used in treating a fracture of the collar bone. It helps to keep the hand raised high up, giving relief from pain due to the fracture.

1. Place the forearm across the chest with the fingers pointing towards the opposite shoulder and the palm over the breast-bone.
2. Place an open bandage over the chest, with one

- end over the hand and the point beyond the elbow.
3. Tuck the base of the bandage comfortably under the forearm and hand.



Fig. 20



Fig. 21

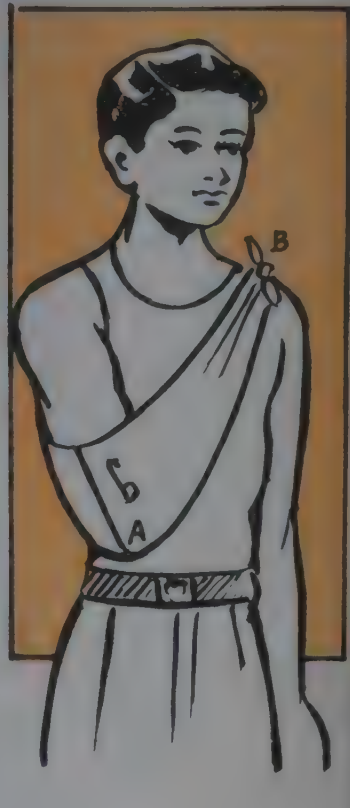


Fig. 22

4. Fold the lower end also around the elbow and take it up and across the back over to the uninjured shoulder and tie it with the other free hand into the hollow above the collar bone.
5. Tuck the point between the forearm and bandage (as shown in the figure).
6. Tuck the fold so formed backwards over the lower half of the arm and fix it with a safety pin. (Fig. 22)

3.3.5 Improvised Slings

Slings may be improvised

1. by turning the free end of a coat and pinning it to the sleeve;

2. by passing the hand inside the buttoned coat or shirt or ;
3. by using mufflers, ties, soft cloth etc.

3.4 **Bandaging:** I with the Triangular Bandage.

1. *For the Scalp* (Figs. 23 to 25)

1. Fold a narrow hem of the base of the open bandage and place it on the forehead just above the level of the eye-brows.
2. Take the two ends backwards, after placing the body of the bandage over the head, the point hanging near the nape of the neck.
3. Cross the two ends and take them forward over the ears to meet on the forehead, where they are tied.
4. Press on the head of the patient, draw the point firmly downwards and pin it to the bandage after taking it upwards. (Fig. 25)

2. *For the Forehead, Eye, Cheek or any part which is round in shape.*

1. Use narrow or broad bandage depending upon the size of the wound.
2. Apply the centre of the bandage over the pad and wind the bandage round the part.
3. Tie in a suitable place

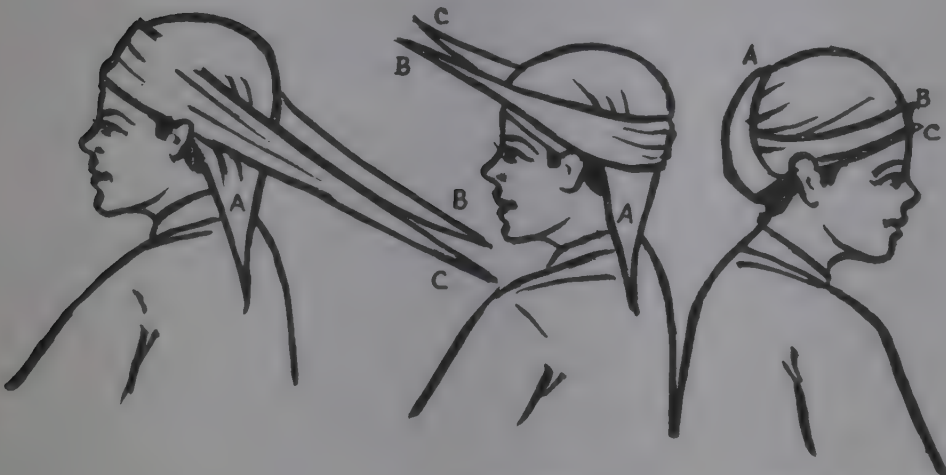


Fig. 23

Fig. 24

Fig. 25

3. *Front or back of the Chest (Figs. 26 & 27)*

1. Place the centre of the open bandage over the dressing, the point over the sound shoulder.
2. Carry the ends of the bandage round the body and tie it in such a way that one end is longer than the other.
3. Draw the 'point' over shoulder and tie it to the longer end.
4. If back of chest has the wound—reverse all the steps. (Fig. 27)



Fig. 26

Fig. 27

4. *For the Shoulder (Fig. 28)*

1. Stand facing the injured side.
2. Place the centre of the open bendage on the shoulder with the point over the side of the neck reaching the ear.
3. Carry the ends, after hemming the base inward around the middle of the arm and tie the knot on the outer side, so that the lower border of the bandage is fixed firmly in position.

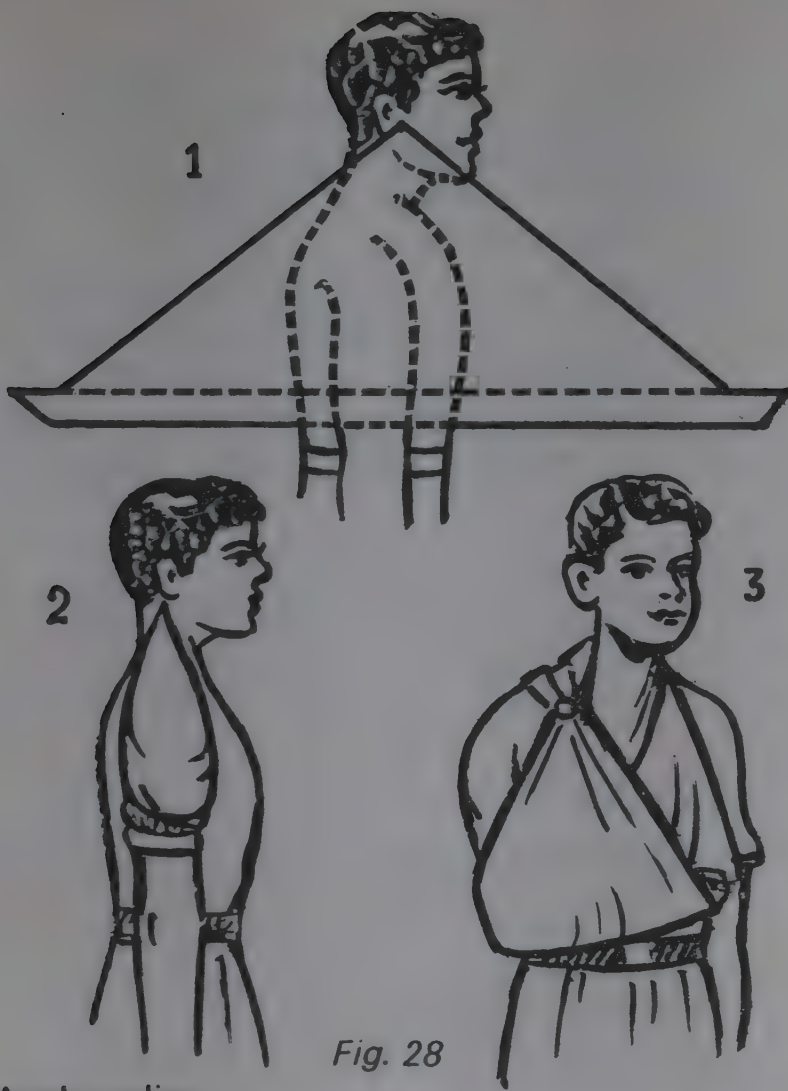


Fig. 28

4. Apply a sling.
5. Turn down the point of the bandage over the sling knot; draw tight and pin it.

5. *For the Elbow* (Fig. 29)

1. Bend the elbow to a right angle if it is advisable to do so.
2. Folding a suitable hem of the base of a triangular bandage and apply it as follows:—
3. Lay the point on the back of the upper arm, and the middle of the base on the back of the forearm.
4. Cross the ends in front of the elbow, then round the arm, and tie the ends above the elbow.
5. Turn the point down and pin it low down.
6. When the elbow should not be bent use an ordinary bandage with figure of eight technique.

6. *For the Hand* (Fig. 30)

1. Place the open bandage in such a way that the injury is uppermost.
2. The point should be towards the fingers and the base across the wrist.
3. Now bring the point over to the wrist.
4. Make a narrow inward hem as usual, pass the ends around the wrist, cross over and tie it up over the point.
5. Turn the point over the knot and pin it.

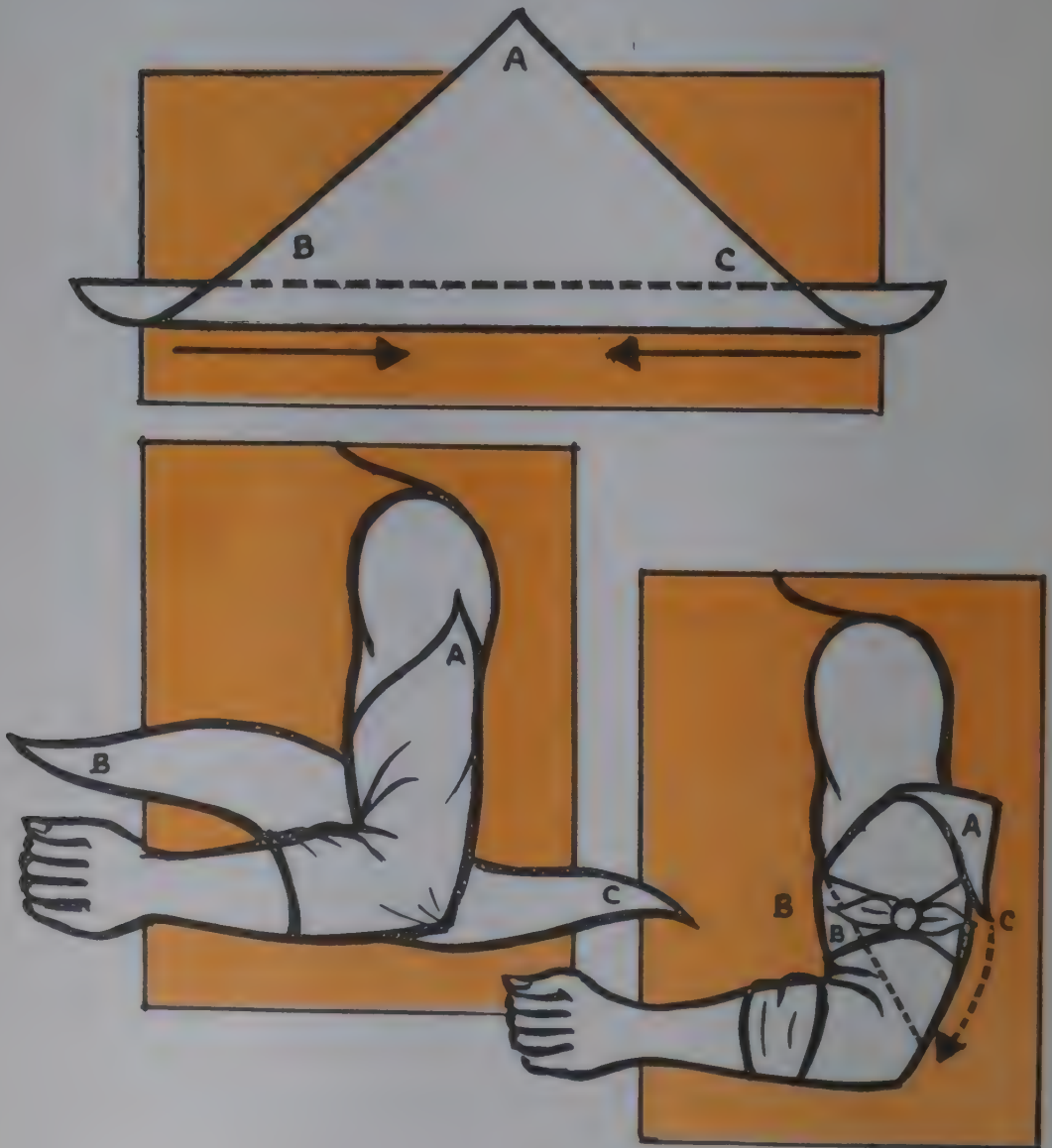


Fig. 29



Fig. 30

7. *For the Hip or Groin* (Fig. 31)

1. Kneel facing the hip and tie a narrow bandage around the waist with the knot on the injured side.
2. Take a second open bandage and pass its point under the knot, bring it over the knot and pin it.



Fig. 31

3. Make a suitably broad hem of the base, bring the ends round the thigh, cross and tie a knot on the outer part, so as to hold lower hemmed border in position. (Fig. 31)
8. *For the Knee* (Fig. 32)
 1. Bend the knee to a right angle.
 2. With a narrow inward hem, place the open bandage in front of the knee, with the point upon the thigh.
 3. Cross the ends, take them upwards on the back of the thigh, bring them to the front of the thigh and tie up.
 4. Bring the point down over the knot and the knee and pin it up. (Fig. 32)
 5. In case the knee is not to be bent, a figure-of-eight bandage, using a narrow or a broad bandage, is applied.

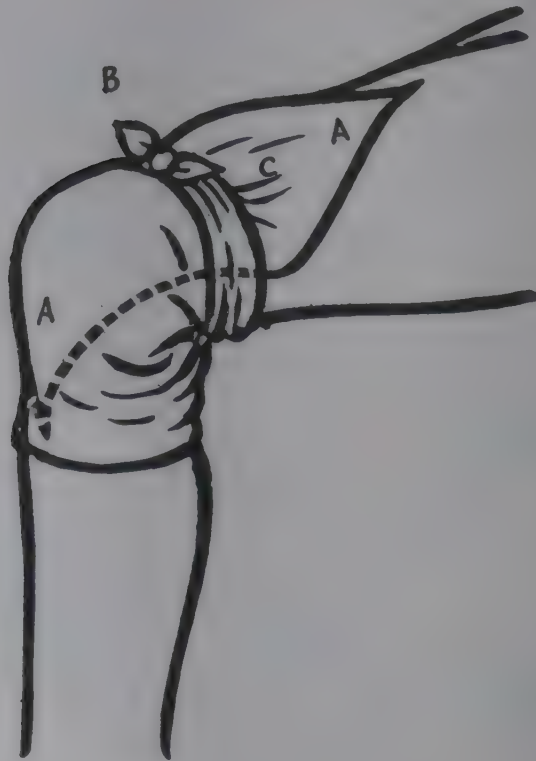


Fig. 32

9. *For the Foot* (Fig. 33)
 1. Place the foot in the centre of an open bandage with the point beyond the toes.

2. Draw the point over the foot on to the leg.
3. Cover the heel with the ends.
4. Cross the ends round the ankle at the back.
5. Bring the ends forward and tie them in front of the ankle.
6. Bring the point down and pin it up. (Fig. 33)

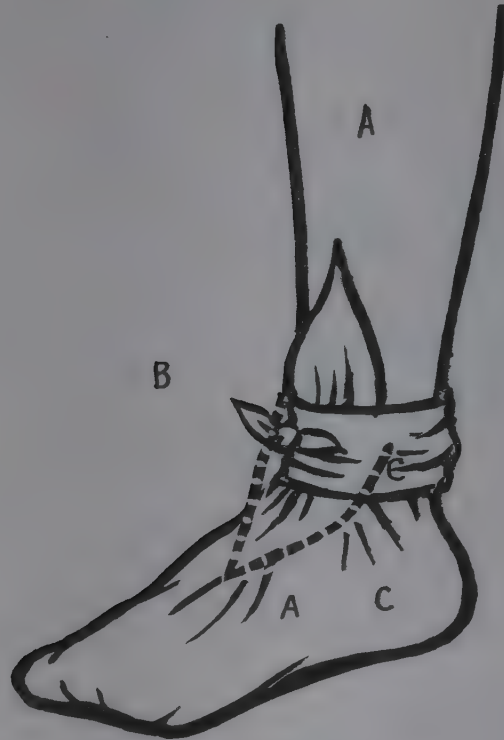


Fig. 33

10. *Stump*

Place the base of a bandage well up on the inside of the stump, the point hanging downwards. Draw up the point over the stump and cross the ends in front over the point. Carry the ends behind the stump, cross them and bring them forward, tying off in front. Draw the point firmly downwards over the knot and secure with a safety pin (Fig. 34),

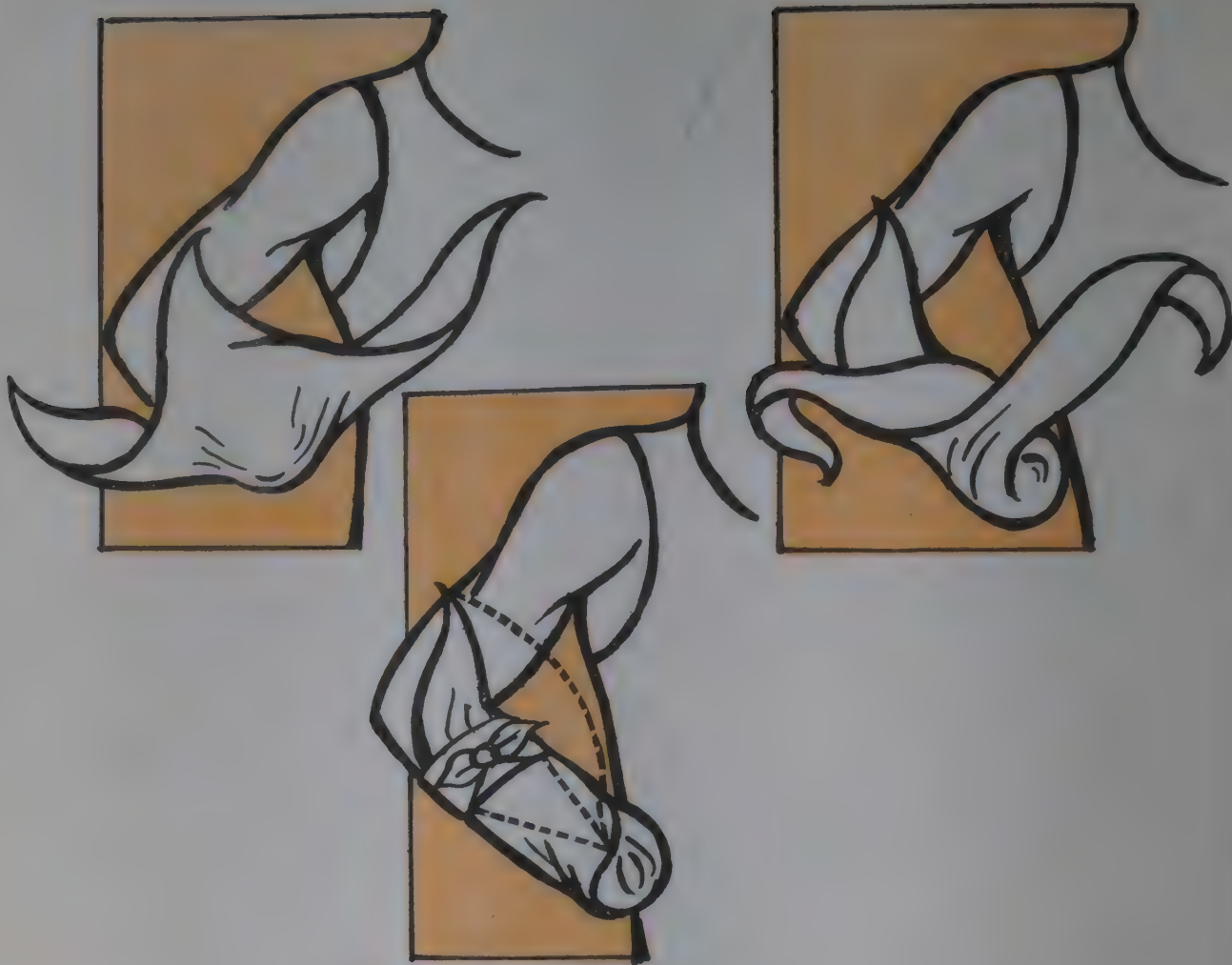


Fig. 34

3.5. **Roller Bandages**

Roller bandages are used in hospitals and first aid posts. They are made out of flannel or cotton material with loose mesh. They are of various lengths and widths.

3.5.1. *Width of Roller Bandages:*

1. 1 inch for fingers and toes.
2. $2\frac{1}{2}$ inches for head and arm.
3. $3\frac{1}{2}$ inches for leg.
4. 6 inches for body.

Roller bandages are also meant to keep dressings in position. The rolled part is called the head, the unrolled portion the tail. Roller bandages should be applied firmly and evenly.

3.5.2. *General Rules for Application of Roller Bandage*

1. Face the patient.
2. When bandaging left limb, hold the head of the bandage in the right hand and vice versa.
3. Apply the outer side of the bandage over the pad and wind it round the injury twice so that it is firm.
4. Bandage from below upwards over the limb. Also make it a rule to apply bandage from the inner side to the outer side.
5. See that the bandage is neither too loose nor too tight.
6. Roll bandage so that each layer covers two-thirds of the earlier layer.
7. Fix the bandage by pinning it up or using a adhesive plaster. The usual practice of tearing the free end into two long tails and tying them up is quite satisfactory and practical.

3.5.3. **Application**

There are four methods of applying roller bandages as follows:

1. *Simple spiral* (Fig. 35)

This is used on fingers or other uniform surfaces. The bandage is just carried round in spirals.

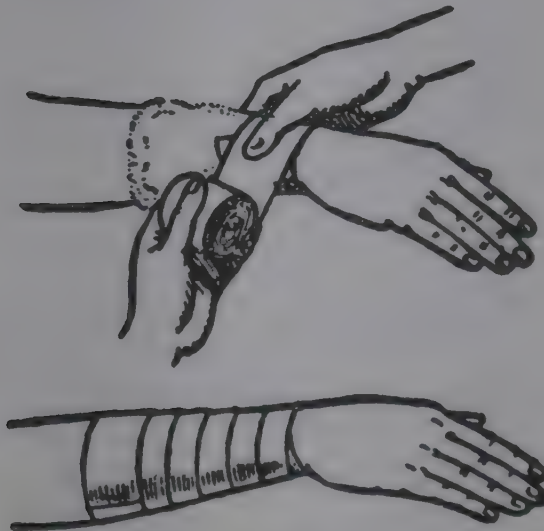
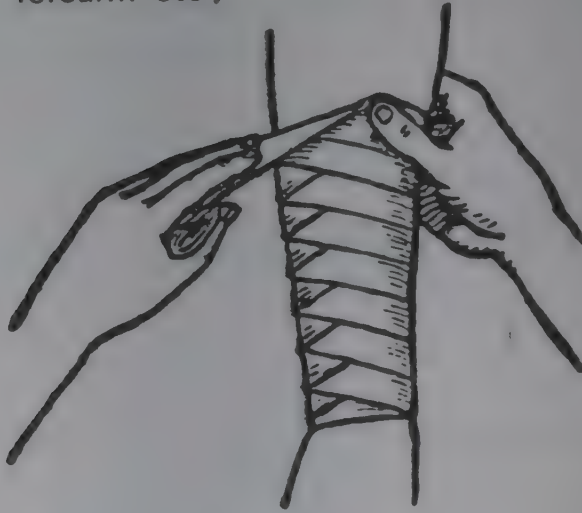


Fig. 35

3. *The Reverse Spiral* (Fig. 36)

This is a modified spiral, in which the roll is reversed downwards on itself at each round; must be used where the thickness of the part varies, like the leg, forearm etc.,



(Fig. 36)

4. *Figure-of-Eight* (Fig. 37)

In this, the bandage is applied obliquely alternately up and down, so that the loops appear like the figure of 8. It is used for joints like the elbow, knee etc.,

4. *The Spica* (Fig. 38)

This is a modified figure-of-eight, and is useful for bandaging the hip, shoulder, groin and thumb

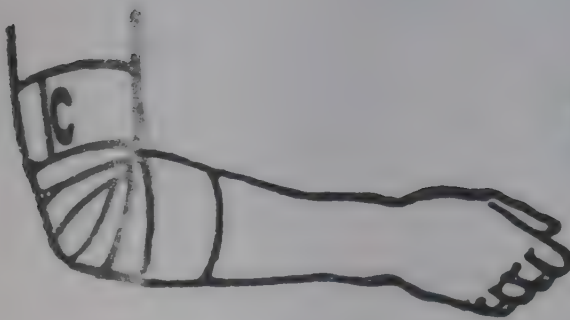


Fig. 37



Fig. 38

SUFFOCATION AND ARTIFICIAL RESPIRATION

4.1. Respiration

- 4.1.1. Respiration means breathing in and breathing out of air. This function is necessary to supply oxygen (of the air) to all the organs in the body. Stoppage of oxygen supply to the organs results in death, sooner or later.

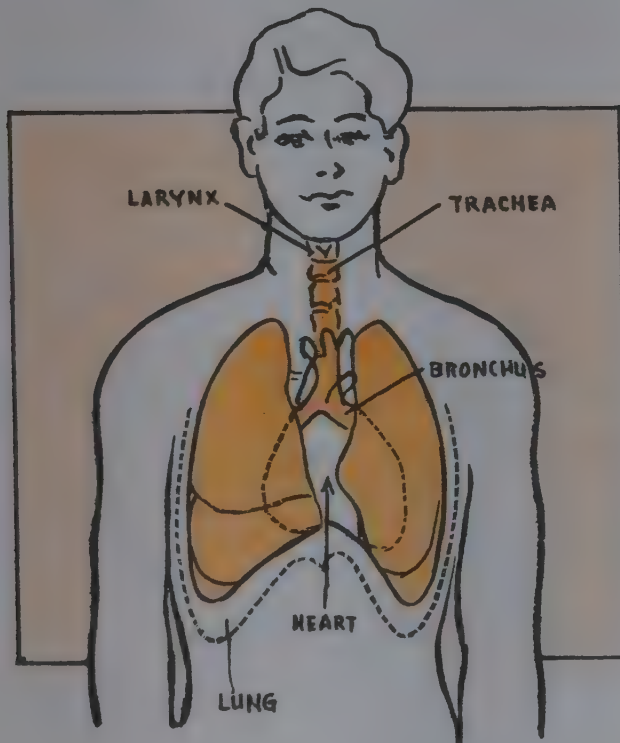


Fig. 39

4.1.2. The Respiratory System

The organs connected with respiration are :

1. The Air Passages and 2. The lungs.

1. The Air Passages

The air passages consist of the nose, the throat (Pharynx), the wind pipe (trachea) and the two air-tubes (bronchi). The bronchi divide into minute branches (bronchioles) which end in the lung substance (alveoli).

2. The Lungs

The lungs are two in number and are situated on the right and left sides of the chest cavity. Each lung is made up of a number of small sacs, called alveoli. The lungs are covered by a membrane called 'pleura' which lines the inner wall of the chest cavity also. (See Fig.40).

4.1.3. The Mechanism of Respiration

During inspiration (breathing in) the diaphragm (the muscle separating the chest from the abdominal cavity) flattens and increases the chest capacity from above downwards. The ribs move upwards and forwards, increasing the capacity of the chest cavity from front to back by the action of the muscles situated between the ribs. The lungs thus expand and air enters them.

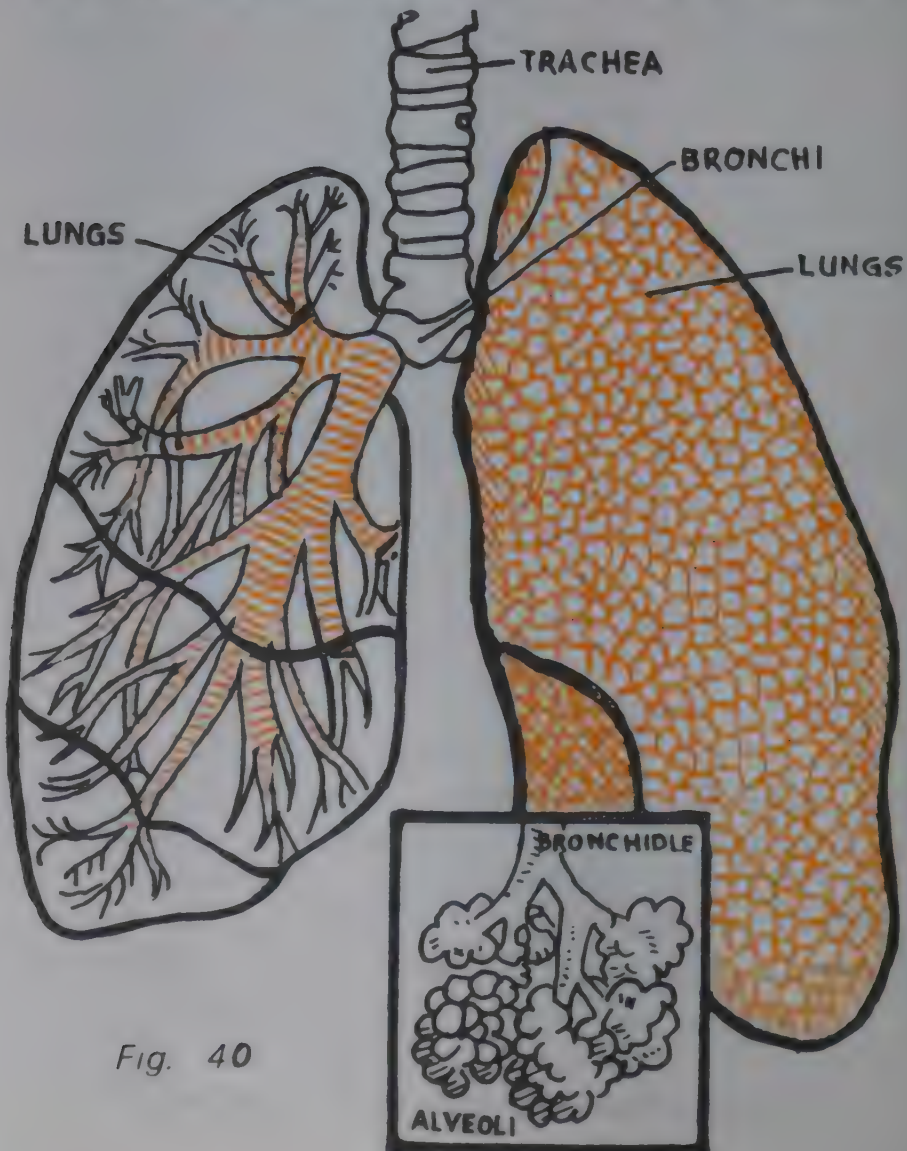


Fig. 40

During expiration (breathing out) the reverse process takes place. The diaphragm comes back to its original state and the ribs fall back, thus forcing the air out of the lungs. (Fig. 8)

Small blood vessels (capillaries) surround the alveoli and exchange of oxygen and carbondioxide takes place through the blood circulating in these capillaries. Oxygen is absorbed by the red blood corpuscles of the blood; water vapour and carbondioxide are let out from the blood plasma into the alveoli.

The lungs are also supplied with nerves which are connected to an area in the brain called Respiratory Centre. This centre controls respiration.

4.2. **Suffocation (Asphyxia)**

4.2.1. Asphyxia is a condition in which the lungs do not get sufficient supply of air for breathing. If this continues for some minutes, breathing and heart action stop, and death occurs.

4.2.2. **Causes**

1. *Conditions affecting the air passage :*

A. *Spasm*

1. Food going down the wrong way i.e. into the air passage;
2. Water getting into air passage, as in drowning;
3. Irritant gases (coal gas, motor-exhaust fumes, smoke, sewer and closed granary gas, gas in deep unused wells etc.,) getting into the air passage.

B. *Obstruction*

4. Mass of food or foreign body, like artificial teeth etc., in the air passage;
5. Tongue falling back in an unconscious patient;
6. Swelling of tissues of the throat as a result of scalding (boiling water) or injury, burns, and corrosives.

C. *Compression*

7. Tying a rope or scarf tightly around the neck causing strangulation.
8. Hanging or throttling (applying pressure with fingers on the windpipe).
9. Smothering like overlaying an infant; and un-

conscious person lying face downwards on a pillow, or plastic bags, or sheets covering face completely for some time.

2. *Conditions affecting the Respiratory Mechanism*
10. Epilepsy, Tetanus, Rabies, etc.
11. Nerve diseases causing paralysis of chest-wall or diaphragm.
3. *Conditions affecting Respiratory Centre*
12. Morphia, barbiturates (Sleeping tablets) ;
13. Electric Shock, Stroke.
4. *Compression of the Chest*
14. Fall of earth or sand in mines, quarries, pits, or compression by grain in a silo, or big beams and/or pillars in house-collapse.
15. Crushing against a wall or other barrier or pressure in a crowd.
5. *Lack of oxygen at high altitudes with low atmospheric pressure.* Acclimatisation — (gradual ascent) is necessary



Fig. 41

4.2.3. *Signs and symptoms* *I Phase*

1. Rate of breathing increases.
2. Breath gets shorter.
3. Veins of the neck become swollen.
4. Face, lips, nails, fingers and toes turn blue.

5. Pulse gets faster and feebler.

// Phase

6. Consciousness is lost totally or partially.
7. Froth may appear at the mouth and nostrils.
8. Fits may occur.

Note : Even after breathing has stopped the heart may continue to beat for ten to twelve minutes. In such cases it is possible to restore breathing by artificial respiration, and bring the casualty back to life.

4.2.4. *Management*

The important things to do are :

1. Remove the cause if possible, or, remove the casualty from the cause.
2. Ensure an open airway to allow the air to reach the lungs. Place the individual on his back. Support the nape of the neck on your palm and *press the head backwards*. Then press the angle of the jaw forward from behind. This will extend the head on

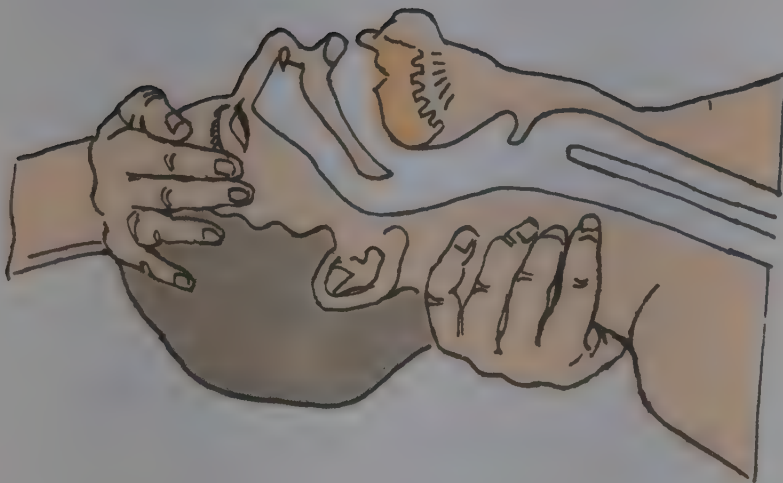


Fig. 42

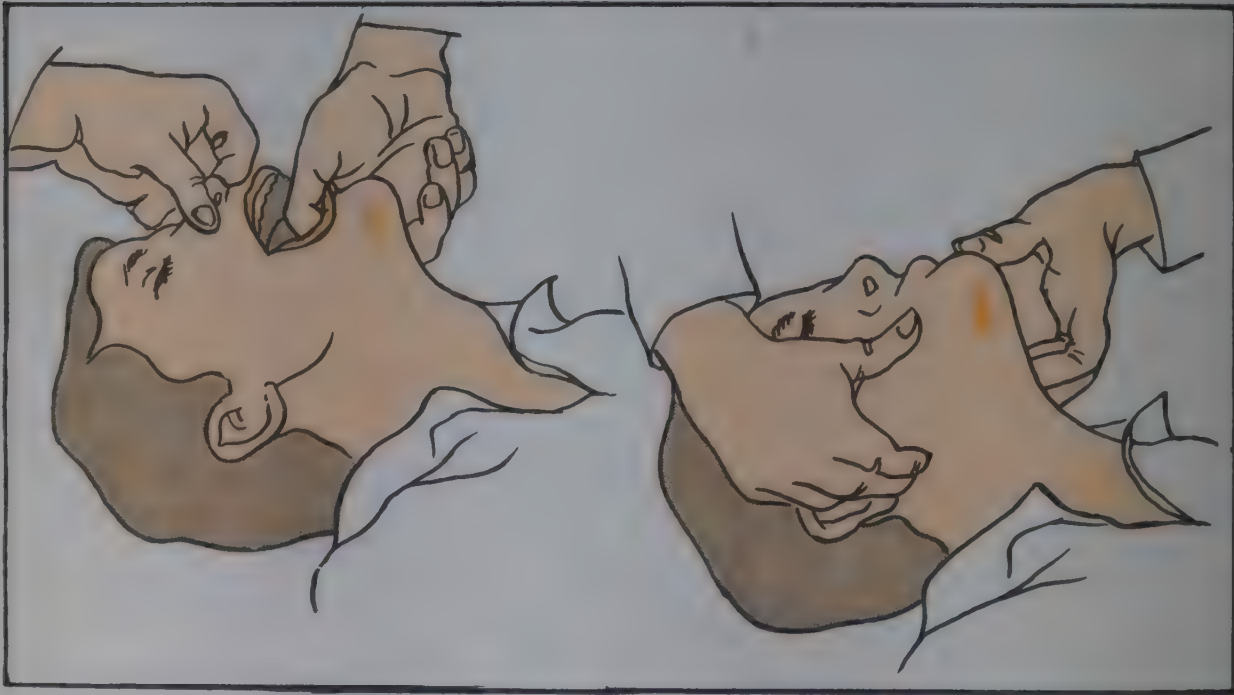


Fig. 43

the neck and lift the tongue clear off the airway. If airway is opened by this method the individual gasps and starts to breathe. Give three or four inflations to the lungs to facilitate breathing by mouth-to-mouth method. If the heart is beating, carotid pulse can be felt at the base of the neck. (Pulse at wrist may not be felt).

Continue to ventilate the lungs until breathing becomes normal.

3. Prevent damage to the brain and other vital organs (which will occur due to lack of oxygen).

Apply artificial respiration to ensure prompt ventilation of the lungs, and if necessary, do external cardiac compression. (See Fig. 48)

Continue artificial respiration until natural breathing is restored. It may be necessary to continue for a long time unless a doctor advises to stop. In case of doubt you should rather continue longer than stop early. Take help from others available in case of need.

5. Keep the body warm by light blankets.
6. Provide shelter to the casualty (at least with an umbrella).

4.2.5. *Different kinds of Asphyxia*

A. Drowning

Drowning is the result of complete immersion of the nose and mouth in water (or any other liquid). Water enters the windpipe and lungs, clogging the lungs completely.

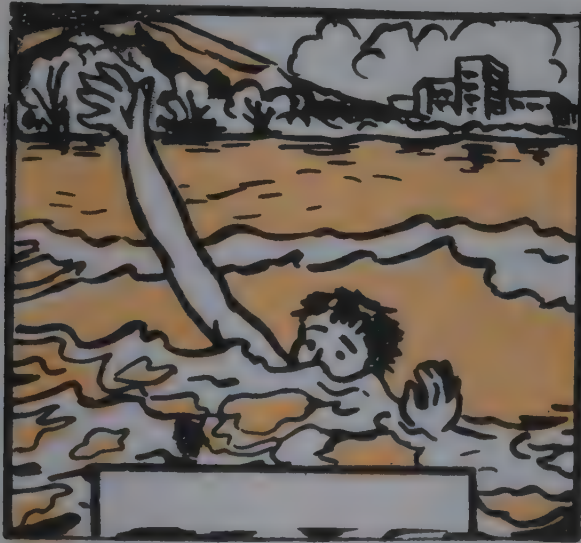


Fig. 44

Management

The aim of first aid is to drain out water (or other matter) from lungs and to give artificial respiration.

1. Act quickly.
2. Turn the victim face down with head to one side, and arms stretched beyond his head. Infants or

children could be held upside down for a short period.

3. Raise the middle part of the body with your hands round the belly. This is to cause water to drain out of the lungs.
4. Give artificial respiration until breathing comes back to normal. This may have to go on for as long as two hours.
5. Remove wet clothing.
6. Keep the body warm, cover with blankets.
7. When victim becomes conscious, give hot drinks viz. coffee or tea.
8. Do not allow him to sit up.
9. After doing the above, remove quickly to hospital as a stretcher case.

B. *Strangulation and Hanging*

- a) Strangulation is usually the result of throttling by hands, or a rope or scarf being tied tightly round the neck.
- b) In hanging the fracture of spine causing compression or tear of the spinal cord is more important.



Management *Fig. 45*

1. Cut or remove the band constricting the throat.

2. If suspended, raise the body and loosen or cut the rope.
3. Give artificial respiration.
4. To do above do not wait for the policeman.

C. *Choking* (Asphyxia due to obstruction in wind-pipe). This is most common with children. A marble, a weed or a button may get stuck in the air passage. In adults too, food may go down the wrong way and choke him.

The aim of First Aid is to remove the foreign body or obstruction.

Management in the case of an adult.
(Hemilich's procedure)



Fig. 15

When victim is standing, the First Aider should stand behind the victim and wrap his arms around the waist. Grasp the fist with your other hand and press the thumb of the fist against the abdomen (belly) slightly above the navel and below the rib cage.

Press your fist into the victim's abdomen with a quick upward thrust. Repeat several times if necessary till the foreign body is expelled out of the wind-pipe. When the victim is sitting, the First Aider stands

behind the chair and performs the same manoeuvre. If the victim is lying, turn him supine (face up). Facing the victim, kneel astride the victim's legs. With your hands one on top of another, place the heel of your bottom hand over the abdomen (belly) between the naval and rib cage. Press into the victim's abdomen with a quick *upward* thrust, repeat several times, if necessary. Should the patient vomit, place him on his side and wipe to prevent asphyxia. Following the expulsion of food particle/foreign body it may be necessary to give artificial respiration.

In the case of an Infant

1. Hold him upside down by the legs and smack his back hard three or four times.
2. If not successful, lay the child prone with his head hanging downwards over the knee and give sharp smacks between shoulders.
3. If still not successful, induce vomiting by passing two fingers right to the back of the throat.

D. Swelling within the throat

Swelling within the throat may occur as a result of trying to drink very hot liquids or swallowing corrosive poisons or may be due to inflammation.

Management

1. Make the patient sit up.
2. If breathing continues normal or is restored to normal, give ice to suck, or cold water to sip.
3. Butter, olive oil, or medicinal paraffin may also be given.
4. Apply cloth wrung out of hot water to the front of the neck.
5. If breathing has stopped, give artificial respiration.

E. Suffocation by Smoke

1. Protect yourself by a towel or a cloth (preferably wet) over your mouth and nose.
2. Keep low and remove the casualty as quickly as possible away from the area.

F. Suffocation by Poisonous Gases

1. Carbon-monoxide (lighter than air)

This gas is present in car-exhaust fumes, in household coal gas; during incomplete combustion of charcoal stoves and in coal mines.

Management

The First Aid treatment consists in removing the person from the area, applying artificial respiration and giving pure oxygen, if available.

1. Ensure circulation of fresh air before entering the room by opening the doors and windows.
2. Before entering the enclosed space take two or three deep breaths and hold your breath as long as you can.
3. Crawl along the floor (as the gas is lighter than air).
4. Remove the casualty as quickly as possible to fresh air.
5. Loosen his clothes at neck and waist and give artificial respiration, if asphyxiated.

G. Carbon-dioxide and others (heavier than air).

This gas is found in coal mines, deep unused wells, and sewerages. Various other gases such as leaking refrigerator gases; compressed gases used for cooking and lighting may also cause suffocation.

Management

1. Observe all the precautions mentioned above.
2. Enter in upright position (as the gas is heavier than air and collects near the floor).
3. Remove the casualty as quickly as possible to fresh air.
4. Wherever ventilation is not possible and deadly poisonous gas is suspected, use a gas mask to protect yourself.

4.3 **Artificial Respiration** (Respiratory Resuscitation)

- 4.3.1 There have been several methods of artificial respiration practised in First Aid. Upto the II World War, Sylvester's method was felt to be the best. During this war mouth-to-mouth (-to-nose) method was discovered and found

to be the best and easiest method to be used under most conditions.

4.3.2 Asphyxia of a severe degree is found along with unconsciousness. General causes are:

- a. The tongue may have fallen back into the throat.
- b. Vomit or spittle may have collected in the throat, or
- c. Some foreign material (like weeds, mud etc.) may have collected and obstructed the air passages.

Therefore, when a casualty is unconscious make sure he is breathing freely.

Begin to work immediately as every minute counts.

Do not delay.

Treatment when not breathing

1. Loosen all clothings at waist, chest and neck.
2. Tilt the head backwards, while supporting the back of neck with your palm. This will lift the tongue to its normal position. Thus the air passage will be cleared and the casualty may begin to breathe after a gasp.
3. If breathing does not begin after the above treatment, help movements of chest and lungs four or five times. This will be usually enough to start breathing. If breathing does not start even now, mouth-to-mouth (-to-nose) breathing should be begun.

4.3.3 *Mouth-to-Mouth* (Fig. 47)

1. Place the casualty on his back. Hold his head tilted back.
2. Take a deep breath with mouth open widely.
3. Keep nostrils of casualty pinched.
4. Cover the mouth of the casualty with your mouth snugly.
5. Watching the chest, blow into his lungs, until the chest bellows up. Withdraw your mouth; note the chest falls back.
(It is hygienic to cover the mouth of casualty with your handkerchief or some clean cloth).
6. Repeat the above 15 to 20 times a minute.
7. If casualty is young (baby or a child), the operations



Fig. 47

are as above, but your open mouth should cover both the mouth and nose of the casualty and blow gently.

8. If the chest does not rise (as in 5 above) look for an obstruction.
 - a. Turn the casualty to a side and thump his back. This will make the obstructing material come to the front of throat. Open the mouth and remove it with your finger covered with a piece of cloth.
 - b. If a child, hold it up by the feet and thump the back.
9. Use mouth-to-nose respiration if mouth-to-mouth is not possible; but now the casualty's mouth should be closed by the First Aider's thumb
10. If the heart is working, continue artificial respiration until normal breathing occurs.
Send for Ambulance.
11. If the heart is not working, you will notice the following.
 - a. The face is blue or pale.
 - b. Pupils are dilated.
 - c. Heart beats and pulse at root of neck (carotid) are not to be felt.
Then treat as follows:
 - a. Place the casualty flat on his back on a hard surface (bench, table etc.).
 - b. Give a smart hit with the edge of your hand on the lower and left angle of the sternum. This usually stimulates the heart to work.
 - c. In case the heart does not work, persist the striking for 10-15 seconds, at the rate of one stroke a second. Feel for the pulse at the root of neck all the time. If the pulse becomes regular and continuous stop beating.
 - d. All the while artificial respiration has to go on.

Notes: Important

- a. Even if the casualty is breathing, but the breathing is not normal, it is wise to start artificial respiration.

- b. Do not begin thumping the heart or compression until you are sure that the heart has stopped beating.

4.3.4 *External Heart Compression* (if there are two trained persons)

- a. This should go on along with artificial respiration. Therefore ask the First Aider giving mouth-to-mouth breathing to sit to the right of the casualty and place yourself on the left side.
- b. Feel and mark the lower part of the sternum.
- c. Place the heel of your hand on the marked part (make sure that the palm and fingers are not in contact with the chest).
- d. Place the heel of the other hand over it.
- e. With your right arm, press the sternum backwards towards the spine. (It can be pressed back 1 to $1\frac{1}{2}$ inches in adults.)



Fig. 48

Notes:

1. Adults should be given about 60 pressures a minute. For children from two to ten years 3 pressures with one hand (heel) will be enough ; but pressure should be 80-90 times a minute.
For babies upto. two years, 2 pressures with two fingers is good enough applied 100 times per minute.

2. Press firmly but carefully. Carelessness may cause injury to ribs and deeper tissues.
3. If the treatment is effective,
 - a. Colour will become normal ;
 - b. Pupil will contract as improvement begins ; and
 - c. Carotid pulse begins with each pressure.
4. When pulse is not restored, continue compression till the patient reaches hospital.
5. Inflation of lungs to heart pressure should be as 2.15. If there is only one First Aider, he has to be very smart and active. Finish 15 heart compressions, rush to head-side, give two inflations to the lungs, and get back to the heart and give 15 compressions. Repeat these.

If there are two First Aiders, No. 1 makes 5 heart compressions and then No. 2 gives two lungs inflations. These are repeated. At the same time No. 1 can watch the pupils and No. 2 can feel the carotid pulse.

WOUNDS AND BLEEDING

- 5.1 When any tissue of the body e.g. skin, muscle, bone etc., is torn or cut by injury, a wound is caused. There will be bleeding from the injured part and it also forms an opening through which germs can get into the body. The depth of a wound is often more important than its area; small deep wounds caused by knives, bullets etc. are often the more dangerous.

5.2 Types of Wounds

1. *Incised Wounds*

are caused by sharp instruments like knife, razor etc. The blood vessels are 'clean cut' and so these wounds bleed very much.

2. *Contused Wounds*

are caused by blows by blunt instruments or by crushing. The tissues are bruised.

3. *Lacerated Wounds*

are caused by machinery, falls on rough surfaces, pieces of shells, claw of animals etc. These wounds have torn and irregular edges and they bleed less.

4. *Punctured Wounds*

are caused by stabs by any sharp instrument like a knife or a dagger. They have small openings, but may be very deep.

5.3 Dangers of Wounds

Wounds cause two great dangers:

1. Bleeding and 2. Infection.

1. *Bleeding*

is the immediate danger and should be treated promptly. (See Chapter 3)

A wound is not initially infected even though it may be contaminated by the dirt and infected material which contain germs. These germs are microscopic and not visible to naked eye. Infection only occurs after a lapse of time when the germs have time to multiply and invade the tissues. This time was formerly arbitrarily fixed at 6 hours but varies with the number of bacteria and their virulence and body resistance. Pus formation is part of bodies method to fight the infection. Our aim as a first aider is to prevent infection occurring. We do this by promptly attending to wounds.

—Wash your hands thoroughly with soap and water.
Do not wipe them dry.

—(Clean the external wound with plenty of good clean drinking water.) Wipe gently the surrounding skin and remove dirt, sticking to wound. Use plenty of running water.

—Do not use any antiseptic in water.

—Dry the surrounding of the wound gently with dry sterile gauze or freshly laundered soft handkerchief, dhoti.

—Pick away foreign material from the wound.

—Cover the wound with dry sterile gauze if available; otherwise use freshly laundered clean soft handkerchief, dhoti or another cloth. Do not let cotton come in contact with the wound.

—Bandage.

—Do not apply any antiseptic in large wounds. This may get absorbed and cause reactions. Please note that the wound itself has not been washed or touched in an attempt to clean.

2. *Infection*

is caused by germs getting into the body through the broken skin. The germs multiply in the wound and make it infected or septic. They may then get into the blood stream and cause blood-poisoning (Septicaemia).

5.4 *Aims of First Aid*

1. The aim of first aid is to stop bleeding and minimise

the number of germs that get into the wound. We should remember that germs come from:

1. the object that caused the wound (knife, stone, etc.);
2. the skin of the person;
3. the clothes of the person;
4. the hands of the First-Aider;
5. dirty dressing;
6. the air; and
7. contaminated water.

5.4.2 *Management*

1. *Stop bleeding*

Apply direct pressure to the wound with a sterile dressing or a clean handkerchief. If necessary press on the arterial pressure-point.

2. Handle the injured part as gently as possible.
3. (Make the patient sit or let him lie down). If the wound is in a limb, and there are no broken bones, raise the limb. This will lessen the bleeding.
4. Wash your hands thoroughly (or clean them with an antiseptic lotion).
5. Remove any foreign objects like glass, stones, etc., if you can easily get at them. This should not open up the wound again which will cause more bleeding. Do not disturb any blood clot already formed.
6. Place a clean dressing over the wound and bandage firmly.
7. Get a doctor.

If you cannot get a doctor or nurse, (you will have to) reach him to one within 6—8 hours.

BLEEDING

- 5.5 Bleeding (Haemorrhage) is a common cause of death in accidents. It is caused by the rupture of blood vessels due to severity of the injury.

5.6 **External and Internal Bleeding**

If the bleeding is from the surface of the body it is called external bleeding.

If the bleeding is within the chest, skull or abdomen etc., it is called internal bleeding. This cannot be seen immediately; but later the blood may ooze out through the nose or ear, or coughed up from the lungs, or vomited from the stomach.

5.7 **Types of Bleeding**

Bleeding may occur from (a) arteries, (b) veins, or (c) capillaries, or from a combinations of the three.

a) *Bleeding from Arteries*

The blood comes out in jets because it corresponds to the beats of the heart in action. The blood will be bright red. This kind of bleeding may cause death very quickly.

b) *Bleeding from Veins*

Blood flows out in a continuous stream and is dark red in colour.

c) *Bleeding from Capillaries*

Blood oozes out slowly, if it is on the surface of the body it is not at all serious.

5.8 *Signs and Symptoms of Bleeding*

1. The casualty feels faint and may even collapse.
2. Skin becomes pale, cold and clammy.
3. Pulse gets rapid but very weak.
4. Breathing becomes shallow, casualty gasps for breath and sighs deeply.
5. There is profuse sweating.
6. The casualty feels thirsty.

5.9 *Management*

a) *Minor Bleeding*

Minor bleeding is usual at work and play. It results from injured capillaries. There is no need to get frightened. The bleeding will stop by itself or by firm pressure and bandaging.

b) *Major Bleeding*

Major bleeding is the result of an injury to a large blood vessel or when persons suffer from blood disease.

The aims of first aid are :

1. to stop the bleeding quickly, and
2. to get immediate medical aid, and/or, if necessary, to take the casualty to a hospital for blood transfusion etc.

5.10 **In the case of severe external bleeding**

1. Bring the sides of the wound together and press firmly.
2. Place the casualty in a comfortable position and raise the injured part (if no bone fracture is suspected).
3. Press on the pressure point firmly for 10 to 15 minutes.
4. Apply a clean pad larger than the wound and press it firmly with the palm until bleeding becomes less and less and finally stops.
5. If bleeding continues, do not take off the original dressing, but add more pads.
6. Finally, bandage firmly but not too tightly.
7. Treat for shock.
8. Get the casualty to hospital as soon as possible.

5.11 **In the case of internal bleeding**

The aim of first aid is to prevent the conditions from getting worse.

1. Lay the casualty down with head low. Raise his legs by use of pillows etc.
2. Keep him calm and relaxed. Reassure him. Do not allow him to move.
3. Keep up the body heat with thin blankets, rugs or coats.
4. Do not give anything to eat or drink because he may have to be given an anaesthetic later.
5. Do not apply hot water bottles or ice-bags to chest or abdomen. This might only make things worse.
6. Take him to a hospital as quickly as possible. Transport gently.

5.12 **Bleeding from Special Areas**

5.12.1 **From Base of Skull**

As a result of head injury blood and brain fluid (cerebro-spinal fluid) may flow out of the nose, ear or mouth.

5.12.2 *Management*

1. Ask the patient not to blow his nose.
2. Do not pack ear or nose, but place a dressing on ear or nose and strap it in position.
3. Lay the patient on the affected side.
4. Remove him to a hospital immediately.

5.12.3 **From the Scalp**

These wounds bleed freely and may be alarming.

5.13 *Management*

1. Do not probe the wound (so that you don't disturb fracture of skull, if any, in the area of the wound).
2. Apply a large pad and a bandage which will help stop bleeding. (See Scalp bandaging).

5.14 **From the Nose**

1. Habitual bleeding during dry weather is common among youngsters; this is not caused by any injury.
2. Adults may bleed from the front portion of the nostril due to minor injury like blowing the nose, or picking out crusts.
3. High blood pressure may also cause bleeding through the nose.

5.15 *Management*

1. Bleeding usually stops in 10 to 15 minutes.
2. Seat the casualty with the head slightly bent forwards.
3. Ask him to breathe through the mouth.
4. Loosen clothing at neck.
5. Pinch the soft part of the nostrils together firmly.
6. Apply a cold compress to the nose for 10 minutes.
7. Ask patient not to blow his nose for some hours.
8. Advise him to see the doctor.

5.16 **From the Gums**

After teeth extraction bleeding from teeth socket may occur immediately or after a few hours.

5.17 *Management*

1. Rinse mouth with water or saline.
2. Place a thick cotton-wool ball in the socket and ask him to bite on it.
3. Send the patient to a dentist or a doctor.

5.18 **From the Palm**

Bleeding from the palm may be very severe, because many arteries could get cut in the palm.

5.19 *Management*

1. Grasp the wrist with your hand tightly for 10 to 15 minutes.
2. Put a suitable pad over the wound, close the fingers over it, and bandage firmly up to and including the wrist.
3. Support limb in a triangular sling.
4. Send him to a doctor.

5.20 **Bleeding from Varicose Veins**

Varicose veins of the leg may burst and severe bleeding may occur.

5.21 *Management*

1. Lay casualty flat and raise the leg high.
2. Apply a pad to the part and bandage firmly.

5.22 **Closed Abdominal Injuries**

Blood may flow into the abdomen as a result of injury to the spleen, the kidney, the intestine, the urethra or of the liver.

1. Get a correct history of accident—note the time of the accident.
2. Find out the level of consciousness (fully conscious, partly conscious or totally unconscious).

5.23 *Signs and Symptoms*

1. Pain over the site of injury which is increased by movement or breathing.
2. Swelling of area.
3. Shock and its symptoms: Pallor, cold and clammy skin, rapid pulse, shallow breathing; nausea, vomiting.

5.23 *Management*

1. Control external bleeding, if any.
2. Treat other wounds and injuries like fractures, bruises etc.
3. Do not give any food or drink.
4. Note pulse and respiration every half hour or earlier.
5. Loosen tight clothing.
6. Reassure patient—cover him up with a light sheet or blanket.
7. Transport him quickly to a hospital or send for medical help. Transfusion of blood may be necessary.

5.24 *Crush Injury*

1. In major accidents like landslides, earthquakes etc. people are caught under machinery, masonry or beams and are possibly under pressure for hours. The injuries may appear simple, with swelling, redness or blister formation or numbness of the whole limb. But after some time of release, the swelling increases, becomes hard due to pouring of fluid from the blood stream.
2. There is loss of blood-substance (plasma) and in addition poisonous (toxic) products from crushed cells pour into the blood stream. This leads to 'shock', i.e., lowered blood pressure, cold clammy skin, paleness and fast thready pulse.
3. If this is not promptly and properly treated kidney failure results.

5.25 *Aims of First Aid*

1. To prevent fall in blood pressure.
2. To avoid kidney failure.
3. To fetch medical aid.

5.26 *Management*

1. Keep head low and raise the lower limbs.
2. If conscious, give a litre of water or tender coconut water. Then repeat the same but in small quantities at a time.

5.27 **Chest Injury**

Injuries to chest should always be treated as serious for without any visible injury there may be fracture of ribs, tear of lungs, heart, or lung vessels.

5.28 **Management**

1. Send all cases as "priority" to hospital.
2. Keep casualty absolutely quiet.
3. Never give any stimulants.
4. Give ice to suck or iced water to sip.
5. Transport gently in the most comfortable position.

5.29 **Blast Injury**

Severe injuries may be caused by explosions.

1. Casualty is anxious.
2. He complains of pain in the chest and is restless.
3. Lips and nail edges become blue.
4. The casualty coughs out frothy blood-stained sputum.
5. Breathing becomes painful.

5.30 **Aim of First Aid**

1. To prevent complications.
2. To carry to the nearest hospital.

5.31 **Management**

1. Reassure casualty.
2. Remove tight clothing etc.
3. Put him in an easy posture.

5.32 **Stove-in chest and 'Whiplash' injury**

1. On suddenly braking a car the chest gets injured with fracture of ribs by knocking on the steering wheel.
2. At other times the neck gets jerked back with tear of the neck ligaments and muscles.

5.33 **Signs and Symptoms**

1. The casualty is restless.
2. He has difficulty in breathing.
3. Face becomes blue because the air-breathed in does not get out.

4. Chest wall loses rigidity due to fractures so that on breathing in the chest is sucked in, and on breathing out the chest is blown out—quite the opposite of normal breathing.

5.34 *The Aim of First Aid*
To fix the chest in position

5.34 *Management*

1. Loosen tight clothing etc.
2. The chest wall has to be fixed to prevent it from falling inwards during inspiration and coming out during Expiration. The forearm and hand is used to splint with a pad over the 'flail' chest and bandaged to give support.

3.31.2. **Stab Wound of Chest**

The casualty will be in a state of extreme shock with anxiety and fear.

5.36 *Signs and Symptoms*

1. Blueness may be present.
2. Air being sucked into the chest cavity can be heard.
3. On breathing out blood-stained froth is seen in the wound.
4. Blood-stained sputum may be coughed out.

5.37 *The Aim of First Aid*

To seal the wound so that air is not drawn into the chest.

5.38 *Management*

1. Squeeze the edges of wound together and hold like that until the pad and blankets are ready.
2. Plug wound with sterile dressing.
3. Cover with thick cotton pad and bandage firmly or apply strapping (sticking plaster).

5.39 **Abdominal Wound**

1. Adjust the patient's position so that the wound does not gape, e.g., if the wound is horizontal place him on his back with head and shoulders raised and a pillow under his knees.

2. If the intestines have come out:
 1. Cover with clean pads.
 2. Don't give anything to eat or drink.
 3. Obtain medical aid; till then give casualty absolute rest in bed.
 4. He has to be transported to a hospital. There may be severe associated internal haemorrhage when patient's pulse becomes feeble and he goes in shock. In that case he should be sent to hospital as a priority case.

5.40 **Pressure Points to Stop Bleeding**

The second method of indirect stopping of haemorrhage is the use of *Pressure Points*. This is adopted when direct pressure becomes a failure. There are quite a large number of pressure points which must be remembered by the First Aider so that he can use the method in emergencies.

Pressure point is an area where an artery along its course can be pressed against an underlying bone so as to prevent the flow of blood beyond that point. Generally, you can feel pulsations at such points.

1. *Carotid Pressure Point:*

- i) Two in number one on either side, these arteries arise from the aorta and pass up the neck on either side of the trachea or windpipe to supply blood to the head area.
- ii) Pressure is applied by the thumb placed in the hollow beneath the voice box and the prominent sternomastoid muscle nearby. It is pressed against the vertebral column behind it (Fig. 72)
- iii) In cut-throat cases, in addition to the digital pressure to be applied as described at (ii) above, the First Aider has to apply digital pressure on the Jugular Vein (large vein) above the wound from which blood will be oozing out, because this vein is also usually injured along with the artery in these cases. In the event of bleeding not stopping even then, digital pressure has to be applied below the wound also. Cover the

wound; treat for shock and take the casualty immediately to a doctor. The pressure on the bleeding points should be continued till the doctor tells you to remove the pressure.

2. *Subclavian Pressure Point :*

- i) As the name indicates these (two) arteries run behind the clavicles on either side.
- ii) These are branches of the aorta, which run from behind the inner end of the clavicle across the first ribs on to the armpits.
- iii) Pressure is applied by pressing one thumb on top of the other in the hollow above and behind the middle of the collar bone, so that the artery is pressed against the first rib
- iv) Before applying pressure bare the neck and upper part of chest; depress the shoulder and bend his head to the injured side. These make it easy to see the area and get the muscles relaxed making the work easy.

3. *Facial Pressure Point :*

- i) The palm is placed across the upper part of the neck in such a way that the thumb is on the lower portion of the lower jaw and the fingers on the back of the head and neck.
- ii) Pressure is applied on the artery at a point which is the junction between the mid-third and posterior the line of the lower jaw.

4. *Temporal Pressure Point:*

- i) The palm is placed so that the thumb is in a line with upper margin of the ear and the rest of palm over the back of the head.
- ii) Pressure is applied about an inch in front of the upper part of the ear backwards against the Temporal bone. The Temporal artery runs at this place before it gives off branches.

5. *Brachial Pressure Point :*

- i) The brachial arteries run along the inner border of the bicep and branches out to supply the upper limb.

- ii) Apply pressure on the middle third of the arm, by passing your fingers under the area.
- iii) It is compressed against the humerus

6. *Radial or Ulnar Pressure Point :*

- i) As their names indicate these lower parts of the Radial/Ulnar arteries pass over the wrist into the palm to form the palmar arch.
- ii) Each of them can be compressed by pressing the thumb against the bone just above the wrists.

7. *Palmar Arch Pressure Point :*

- i) As noted above, the arch is formed by anastomosis of the terminal points of the Radial & Ulnar arteries beyond the middle of the palm.
- ii) Pressure is applied by a single thumb which is placed flat across whilst the rest of the palm and fingers are on the back of the injured palm.

8. *Femoral Pressure Point;*

- i) Femoral arteries are of the thighs. They are a continuation of the abdominal aorta; they help supply the lower limbs with blood.
 - ii) The artery enters the thigh about midway in the groinfold and runs a little inwards upto the upper two thirds of the thigh and then passes to the back of the knee.
 - iii) To apply pressure: bend the knees slightly, grasp the thigh with both hands so that each of the thumbs is at about the centre of the groin. Place the left thumb over the right and apply pressure directly backwards against the pelvic bone
-

SHOCK

- 6.1 Shock is a condition of collapse which should be treated on top priority second only to attending to obstructed breathing, stoppage of heart, or severe bleeding. It may lead to death if not treated in time.

6.2 Types and Causes

Shock can be divided into two types:

Nervous shock and true shock.

Nervous shock is due to strong emotional upset, e.g., fear, pain, or bad news; and not necessarily due to a serious injury. (Does not need treatment, as such).

True shock is seen in the following accidents:

1. Severe Bleeding

- a) Shock is produced with loss of blood.
- b) It may develop at once or be delayed.
- c) Bleeding may be seen outside when coming out of a cut artery or the tear of a varicose vein; or it may be inside; for example, bleeding into the chest or abdominal cavity.
- d) The faster the loss of blood the faster the onset of shock. But beware of slow loss of blood, which will appear to be simple at first but later may become very serious.

2. *Severe Burns*: when extensive, i.e., when more than half the skin surface is affected.

3. *Heart Attacks*: when the blood supply to the heart is obstructed.

4. *Abdominal Emergencies*: like burst appendix, perforated stomach, intestinal obstruction etc.

5. *Crush-injuries*: as in collapsed buildings, explosion etc.

6. *Loss of body fluid* due to excess of vomiting, diarrhoea, dysentery etc.

7. *Bacterial Infections*. Discharge of poisons (toxins) into the blood caused by bacteria.

6.3

Signs and Symptoms of Shock

1. Casualty feels faint or giddy.
2. Complains of blurring of vision.
3. Feels cold with clammy skin.
4. Face and lips look pale.
5. Pulse may become slow at first but later always beats faster but gets feeble.
6. Vomits (in many cases).
7. Becomes unconscious in later stages of shock.

6.4

Management

1. Reassure the casualty (when conscious).
2. Put him comfortably on his back. Except in cases of injury of the head, of the chest or of the abdomen, lower the head slightly and turn it to a side. In cases of vomiting place in the three-quarter back-up position. (See Fig. 52).



Fig. 52

3. Loosen tight clothing, but do not remove clothing.
4. Wrap in light bed-sheet or thin rug.
5. Never use hot water bottles or very warm rugs. Do not rub any part of the body with anything.
6. In cases of injuries to chest or abdomen, nothing should be given by mouth as he may later need an operation or blood transfusion.
7. Observe all the above quickly as even minutes delayed may mean death. If there is no chest or abdominal injury, and the patient is conscious, give sips of water, hot tea or coffee or cocoanut milk. (Never give any alcoholic drinks).
8. *Most important:* Remove to hospital as top priority.

6.5 **Electrical Injuries**

6.5.1 *Causes of Electrical Injuries*

If any part of the body comes in contact with a 'live' wire which is exposed and not covered by insulator, or with a cable or rail in which current is leaking, a person gets an electric shock. In houses, the blowing out of switches or fuses or faulty electrical connections can cause such injury. The injury may be quite mild or so severe as to cause immediate death.

Electrical shock is produced only when an electric current passes through the human body which is in contact with earth. It passes even more quickly if the part is wet.

In wet conditions even lower voltage may be dangerous. A very strong current, passing to earth through lower



Fig. 53

limbs may be less dangerous than a weaker current passing through the chest, especially so when it enters through the hands and arms.

6.5.2 *The effect of electric shock*

1. There may be fatal paralysis of heart.
2. There may be sudden stoppage of breathing due to paralysis of muscles used in breathing.
3. Heart may continue to beat, while breathing has stopped. In this condition the face appears blue.
4. There may be burns, either superficial or deep. They depend on the strength of the electric current causing the injuries.

6.5.3 *Management*

Intelligent and prompt action is required. If the first aider is not cautious, he may also receive severe electric shock or even die along with the casualty.

1. If the casualty is still in contact with the conductor, switch off the current. If the switch is not to be found, remove the plug, or cut off the current by breaking the wire. (Before cutting off the current, ensure that you stand on a dry piece of wooden board. Do not use scissors or knife.

Precautions :

When the current is of low voltage the first aider should stand on an insulated material which is dry. (Insulating materials are rubber-soled shoes, wooden planks or piles of newspaper). Rubber gloves, if available, should be worn. If not, dry coat, cap, or other clothing may be used. Folded newspaper also gives protection.

When the current is of a very high voltage, as in the case of over-head (high tension) lines, there is greater danger. The casualty may not be in actual contact with the wire as the current can pass through the gap (causing an arc). The First Aider in such circumstances should keep as far away as possible from the electric wires. (The casualty is to be dragged out by means of a non-conducting material. A walking stick,

dry bamboo pole, wooden plank or a dry rope is to be used).

2. If the casualty is not breathing normally, or heart has stopped beating, give artificial respiration and external cardiac massage for a long time.
 3. Treat for shock (See page 25).
 4. Treat for burns, if any (See page 117)
 5. Transfer to a hospital, or seek the help of a medical practitioner, who is nearest.
 6. Even when the casualty has recovered fairly well after first aid is given, he must be examined by a medical specialist because electric injuries are liable to relapse.
-

INJURIES TO BONES (FRACTURES)

7.1 **Fracture**

A fracture is the partial or complete breakage of a bone.

7.2 **Causes of Fractures**

7.2.1 *Direct force*

The bone breaks at the spot of application of the force e.g. bullet passing into bones ; severe fall on a projecting stone, or a wheel passing over the body etc.

7.2.2 *Indirect force*

The bone breaks away from the spot of application of force e.g. collar-bone-fracture when the fall is on outstretched hands etc.

7.2.3 *Force of Muscular Action:* occur when there is a violent contraction of a group of muscles. This happens very rarely e.g. fracture of ribs' on violent cough.

7.3 **Types of Fractures**

7.3.1 *Simple (Closed) Fracture*

The broken ends of the bone do not cut open the skin and show on the outside.

7.3.2 *Compound (open) Fracture*

When the fractured bone is in contact with outside air as a result of an injury (so that dirt, dust, and germs get into the protruding bone and the wound).

7.3.3 *Complicated Fracture*

In addition to the fracture, an important internal organ like the brain or major blood vessels, the spinal cord, lung, liver, spleen etc., may also be injured. Furthermore, a complicated fracture may be simple or compound.

7.4 *Signs and Symptoms*

1. Pain at the spot of fractures and/or around it.

2. Tenderness i.e. pain on gentle pressure over the injured spot. (Do not press hard).
 3. Swelling of the area and discolouration.
 4. Loss of normal movements of that part.
 5. Deformity of Limb:
The limb may lose its normal shape. Sometimes the muscles will pull up the lower free ends, causing apparent shortening of the limb.
 6. Irregularity of the bone:
If, as in the leg bone, the break is under the skin, the irregular outline of the bone can be felt easily.
 7. Crepitus (grating):
When one end of the broken bone moves against the other, a crackling sound is heard, which is known as crepitus.
 8. Unnatural movement at the spot of fracture can be felt.
- N.B.:— *The last two signs should never be tried by the First-Aider.*

To confirm diagnosis compare with the sound limb; look for tear of clothing or of skin at the fracture area; and the patient himself may sometimes state that he heard the snap of the bone.

7.5 *Management*

7.5.1 The aims of first aid are:

1. to prevent further damage;
 2. to reduce pain;
 3. to make the patient feel comfortable; and
 4. to get medical aid as soon as possible.
1. Fractures often occur in major accidents. Therefore it is common to find other injuries also. The First-Aider must decide which is more urgent. Heavy bleeding and severely wounded parts are more urgent and should be treated first.
 2. There may be more than one fracture in the same patient or even in the same limb.
 3. If there is no immediate danger to life, temporary attention to fracture is enough.
 4. Treat the fracture on the spot, so that the frac-

tured ends are stabilised and patient is ready for transport.

5. Handle very gently; avoid all unnecessary movements of the injured part.
6. Send for medical aid or send the patient to hospital, as quickly as possible. Also inform party's relatives.
7. Treat for shock.
8. If the broken ends of the bone show out, do not wash the wound or apply antiseptics to the ends of the bone.
9. Do not handle the fracture unnecessarily; the simpler the first-aid, the better.
10. Never attempt to bring the bones to normal position or reduce the fracture.

7.5.2. *To stabilise the fractured bone end*

1. Steady and support the injured part immediately, so that no movement is possible. This stops further injury and helps to stop the bleeding. Moreover the danger of the broken ends of bone damaging arteries, nerves and muscle is prevented.
2. Immobilise the fracture area and the joints on both sides of fracture (above and below fracture site).

A. By using bandages, and/or

B. By using splints where available and where a First-Aider is confident of their use.

A. **Using Bandages**

Usually it is enough to use the other (uninjured) limb or the body of the patient as the splint. The upper limb can be supported by the body, the lower limb by the other limb (provided that also is not fractured). Most fractures (except forearm) can be immobilised thus.

1. Do not apply bandage over the area of fracture.
2. The bandaging should be fairly firm so that there is no movement of the fractured ends; but not too tight in which case the circulation of blood to the area will be stopped. If there is further swelling of the injured area, the bandage is too tight, therefore loosen the bandages

slightly.

3. Always place padding material between the ankles and knees and other hollows, if they have to be tied together, so that when limbs are bound together they are comfortable and steady.
4. As the patient will be lying down the bandage should be passed through the natural hollows like the neck, the lower part of trunk, knees and just above the ankles, so that the patient's body is not jarred.
5. Always tie knots on the sound side.

B. Using Splints (when available and necessary expertise is there).

1. A splint is a rigid piece of wood or plastic material or metal applied to a fractured limb, to support it and to prevent movement of the broken bone.
2. Reasonably wide splints are better than narrow ones.
3. They should be long enough so that the joints above and below the fractured bone can be made immobile.
4. The splints should be well padded with cotton or cloth so as to fit softly and snugly on the injured limb.
5. Splints are best applied over the clothing.
6. In an emergency splints can be improvised with a walking stick, an umbrella, a piece of wood, a book or even firmly folded newsprint.
7. Use of splints becomes obligatory only when e.g. both legs or both thigh bones are broken.

7.6 Special Fractures

7.6.1. *Fracture of the skull*

Fracture of the skull may injure the brain, nervous system or the arteries and may cause concussion and compression.

There are two varieties of skull fractures :

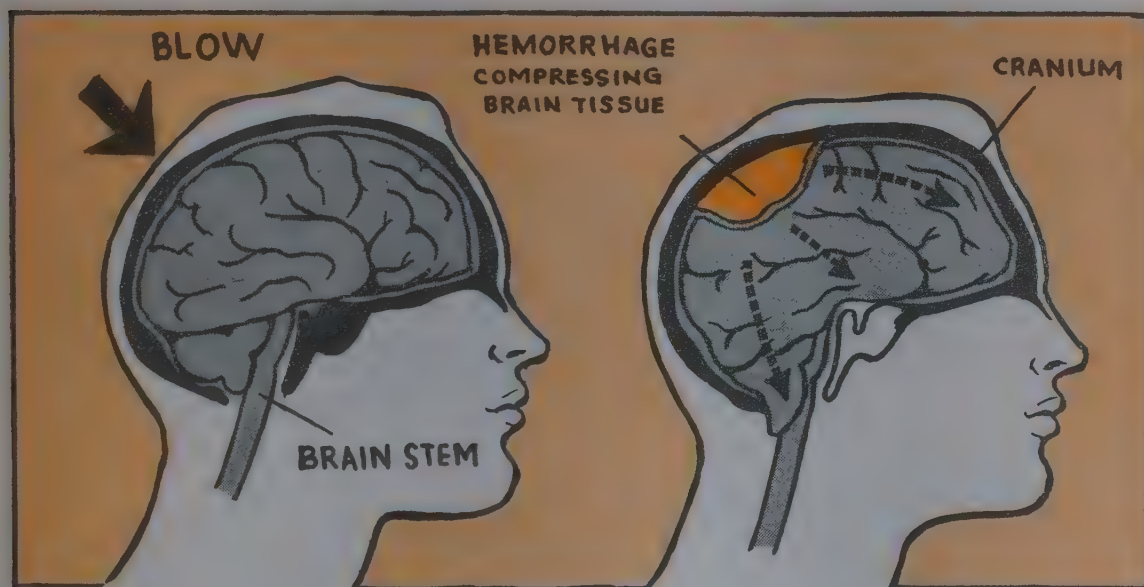
- a. Fracture of the dome or sides, and
- b. Fracture of the base.

a. *Fracture of the upper part or sides*

This is caused by direct blow or fall upon the head. There will be swelling with a longish or circular irregularity of the bone. The First-Aider, however, should not attempt to look for these fractures.

b. *Fracture of the base of skull*

This is caused by indirect injury, for example, fall on the feet, fall on the lower part of the spine, severe blow on the lower jaw and rarely by a severe blow on the side of the head. Blood or brain-fluid may flow from the ear, or nose, which may be swallowed and later vomited. If the injury affects the bony socket of the eye, the eyes become blood-shot. It is often missed.



(Fig. 54)

Management

1. *If breathing is soft and normal:*
 - a. Lay the casualty on his back with head and shoulders slightly raised by cushions.
 - b. Turn the head to one side (if there is bleeding from the ear, the head should be turned so that the bleeding side is down).
2. *If breathing is noisy with bubbling of air through secretions in the chest.*
 - a. Lay the casualty in the there-quarter-prone position. (Fig. 55)

- Support him in this position by pads in front of the chest and draw up the casualty's upper knee.
- b. Keep the air passages clear.
 - c. In cases with bleeding from the ear, arrange the position of casualty so as to keep this side of the face down.
3. Treat for shock.
 4. Keep a careful watch on the casualty.
 5. Do not give anything to drink.
 6. Do not rouse him.
 7. Maintain the same position in transport; avoid disturbing the casualty.

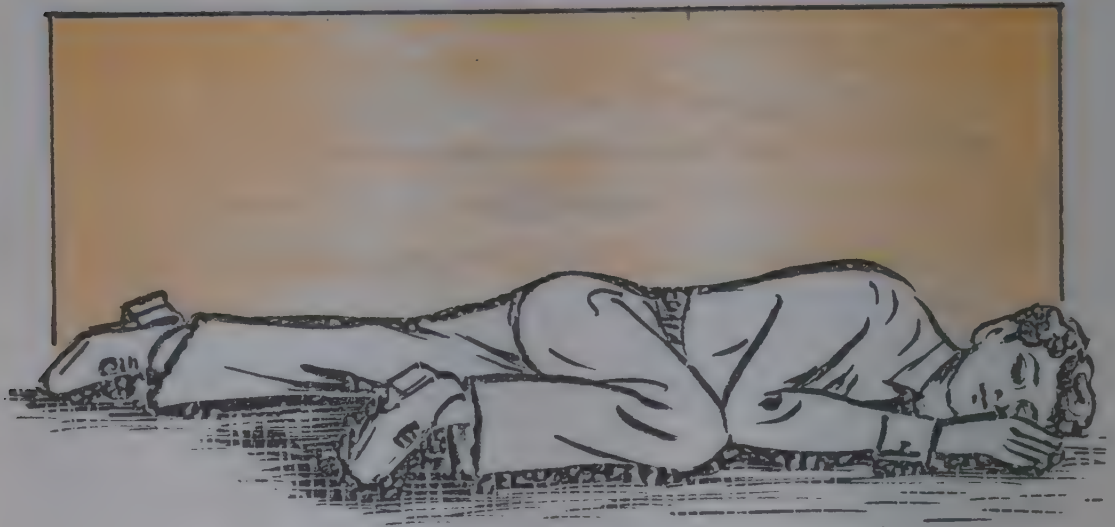


Fig. 55

7.6.2. *Fracture of the Lower Jaw*

This is mostly the result of direct force. Usually one side is affected, but rarely both sides may be fractured. In most cases this fracture is a compound one. There is usually a wound inside the mouth also.

Signs & Symptoms

1. The casualty has difficulty in speaking/opening mouth.
2. His spittle becomes blood-stained.
3. There is pain, which is increased by speaking and swallowing.
4. The face and lower jaw becomes swollen.
5. The teeth look irregular; some teeth may have fallen out.
6. There may be crepitus, it can be felt both by the

patient and First-Aider, when they try to steady the jaw.

7. If there is an injury of the tongue, it may fall back and block the air-passage and there will be profuse bleeding.

Management

1. Ask the casualty not to speak.



Fig. 56

2. Remove false teeth, if any. Make sure the tongue does not slip back. Ensure an open air-way.
3. With the patient leaning forward place the palm or your hand on the chin and gently press the lower jaw upwards against the upper jaw (which acts as splint).
4. Place a narrow bandage under the chin. Carry one end up and over the top of the head, cross with the other and over the ear. Carry the shorter end across the front of forehead and the longer end in

the opposite direction around the back of the head. Tie just above the opposite ear. (Fig. 56)

5. If the casualty shows signs of vomiting, remove the bandage and tie it up again after vomiting stops.
6. Remove him to hospital.

Transport

1. If the patient can sit, make him bend his head forward and downwards so that the tongue may not slip back and choke him.
2. If a stretcher case — that is when the fracture is compound or extensive — turn casualty face down on a blanket, load him on the stretcher with the 'blanket lift' (See Fig. 56) with head projecting beyond the canvas and his forehead supported by hammock-like bandages tied to the handles of the stretcher and a blanket under the chest so that the head hangs forward.

7.6.3. Fracture of the Spine

Vertebrae, which together form the spine, are small bones which have to bear the weight of the head and trunk. They are commonly fractured;

INDIRECTLY by:—

1. lifting a heavy weight:

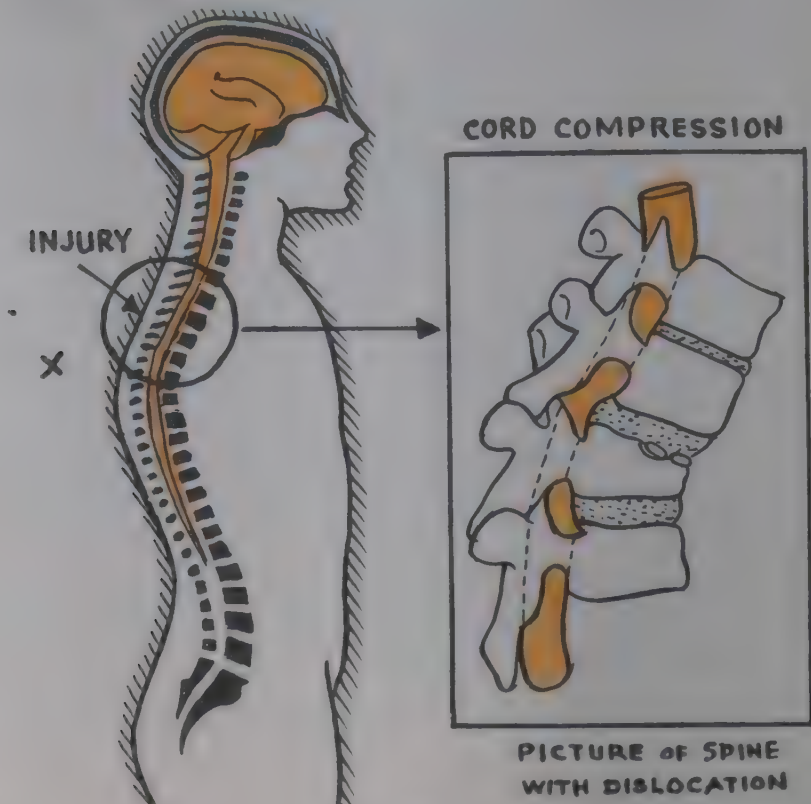


Fig. 57

2. landing on the feet or buttocks in a heavy fall ;
3. being thrown forward suddenly (e.g. a car driver during a collision) ; or
4. neck fractures in whip-lash injuries.

DIRECTLY by:—

1. the fall of a heavy weight across the back ; or
2. falling from a height on the back across a bar ;
3. direct fractures of the spine are also common in landslides, earthquakes, etc., when a heavy mass falls on the spine.

The fracture will be more serious if the spinal cord is injured. As a result there may be loss of power of the muscles (paralysis) and loss of sensation of the skin below the level of the injury.

Injury to the spine is always a serious emergency.

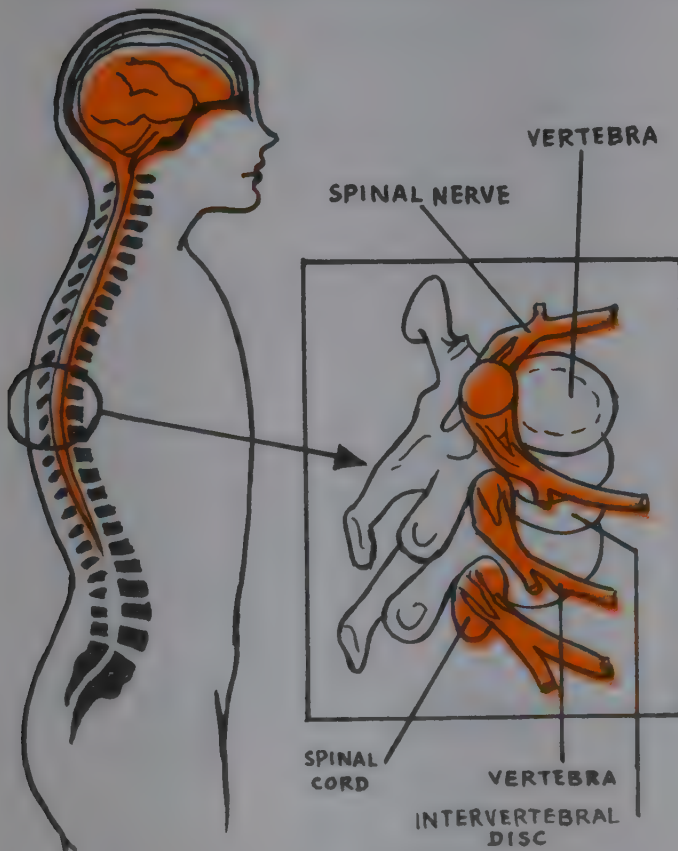


Fig. 58

1. Fracture of spine should be suspected in all cases of back injury. There will be pain and shock in all cases.

2. Just because there is no paralysis, do not neglect the case. Treat it as fracture until the case is in medical hands.

Management

1. Try to get a doctor immediately.
2. Make the casualty lie still. Never allow him to get up.
3. If unconscious — see that the tongue does not fall back and choke him.
4. If medical aid is immediately available.
 - a. Do not move him about; cover with a light bed-sheet or in cold weather a thin blanket.
 - b. Keep him under observation till the doctor comes.
5. If medical help is not at hand, prepare the casualty for removal on a stretcher.
 - a. Place pads between thigh, knees and ankles.
 - b. Tie a 'figure of eight bandage' over ankle and feet with the knot on the sole of foot.
 - c. Apply broad bandages on knees and thigh.
 - d. Keep ready to shift to a nearby shelter.

NOTE:

Carry patient face upwards, for, in this position the spinal cord is not likely to be damaged further.

Transport

1. The canvas stretcher must be made hard surfaced by short boards placed across the stretcher or a long board placed lengthwise. A sufficiently long and broad board can be used by itself, if no stretcher is available.



2. Cover the stretcher with a blanket, place small pillow for neck and small of the back so that the hollow of neck and the back rest in the normal position.
3. Do not disturb the position of the casualty when loading on to the stretcher. One person must hold the head firmly but gently; the aim is not to disturb the neck. A second helper should hold the legs just above the ankles, the aim is not to disturb the trunk.
4. *If casualty is not on a blanket:* (Fig. 60)
 - a. Place the blanket or sheet on the ground in line with the patient and roll up half its width.
 - b. Instruct the two bearers to keep the head and ankles firm and steady. Two other first aiders then very gently turn the casualty on to his side, taking care not to disturb the fractured part.
 - c. Now, move the rolled part of rug to be in contact with the casualty and gently roll him over so that the other side of his body is in contact with the ground.
 - d. Now it is easy to unroll the rolled part of the blanket and place the casualty on his back on the centre of the blanket.



Fig. 60

Note:

During all these changes of position the bearers at neck and ankles work in unison with the other two so as not to disturb the spine.

5. *Loading the Stretcher*

The two methods used for loading the stretcher are

- a. *Blanket lift* (Fig. 61)

- i. If poles of good length and rigidity are available, roll the blanket over the poles until the poles are pressed to the sides of the casualty.

ii. With two bearers supporting the neck and ankle, the others stand two on each side and lift the casualty. Now the stretcher is placed exactly under the casualty, who is gently lowered on to the stretcher.

- iii. Now make sure that neck and back pads are in correct position and supported to avoid undesired movement.

iv. If poles are not available, the blanket is rolled tightly upto the sides of the casualty. If necessary, broad bandages are placed round the body, one at the level of thighs and another at the level of the shoulders. Now lift the casualty adopting the same method described above.



Fig. 61

- b. *Emergency lift*

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- i. Open the casualty's coat or bush-coat and roll the free ends firmly close up to the side of the casualty's body or improvise stretcher.
- ii. Loading to the stretcher is identical to the method described under blanket lift.
- iii. In the case of neck injuries place sandbags on either side of the neck to steady it.
- iv. Place folded blankets under the neck, the small of the back, and under the knees.
- v. Wrap the casualty in a thin bed-sheet or a thin blanket.
- vi. If a long journey over uneven ground is needed, bind the body to the stretcher firmly, around the hips, thigh, below the knees and over the body above the elbow level.
- vii. On reaching the shelter, do nothing; wait for medical help.

7.6.4 *Fracture of the Ribs.*

Ribs are broken by—

1. Direct force : From a blow or fall upon the chest or hit against the driving wheel of a car. The broken end may be driven inwards causing injury to the lung, which then becomes a complicated fracture; or
2. Indirect force : As a crush caused by pressure over the front and back of chest at the same time. The broken ends are pushed outwards, thus there is no fear of injury to lungs.

Signs and Symptoms

1. There is pain at the injured are, increased by coughing and deep breathing.
2. The casualty takes short, shallow breaths so that the ribs do not move and increase the pain.
3. Crepitus may usually be felt if the hand is placed flat over the chest particularly the broken rib. But the first aider should not try to find this sign at all.
4. Signs of internal bleeding should be looked for.
5. If there is an open wound in the chest air is sucked in and blown out through the wound like the bellows. This is a serious condition.

If the fracture is not complicated:

1. Two broad bandages should be applied round the chest. The centre of the first should be below the area of pain and the centre of the second above it. The upper bandage should overlap the lower by half its width.
2. Instruct the casualty to breathe out as much as he can and then tie the knot firmly so as to support the broken rib. The knots should be tied nearer the front of the chest on the uninjured side.
3. Support the arm on the side of injury in a sling.
4. If there is no relief of pain by this treatment, remove the bandages and send the case to the doctor, in the sitting position.

If the fracture is complicated:

1. Do not apply bandages, except in cases where air is sucked in through an open wound, in the chest.
2. Lay the patient with raised head and shoulders, and turned towards the injured side. Keep in position with a blanket folded lengthwise and tucked to the back of the casualty.
3. Apply sling to the arm in the injured side.
4. Transport as stretcher case.

7.6.5 *Fracture of the Breast-bone*

Cause : The breast-bone is usually fractured in crush injuries. The danger is that the heart and the great blood vessels under it may be injured too.

Signs and Symptoms

1. Pain at the area of fracture.
2. Difficulty in breathing.
3. Irregularity of the bone (felt by running fingers along it).

Management

1. Untie tight clothing.
2. Place the casualty on his back in the most comfortable position.
3. Cover him with light materials.
4. Transport on a stretcher.

7.6.6 *Fractures of the Collar-bone (Fig. 62)*

Cause : The Collar-bone is normally broken when the

person falls on the tip of the shoulder or on the palm of the outstretched hand.

Signs and Symptoms

1. The arm on the injured side is partially helpless. The casualty usually supports it at the elbow with the other hand.
2. His head is inclined towards the injured side.
3. The broken ends can be seen and felt. They overlap, the outer end being lower.

Management

1. Support the arm of the injured side with the help of the casualty himself or an assistant.
2. Do not remove the coat or bush-coat.
3. Place a pad in the arm-pit.
4. Leaving the forearm free, bandage the upper arm to the side of the chest with a broad bandage.
5. Support the upper limb in the triangular sling.
6. Feel the pulse to make sure that circulation in the limb is free.
7. Shock is not usually severe; the casualty may be transported even as a walking case.

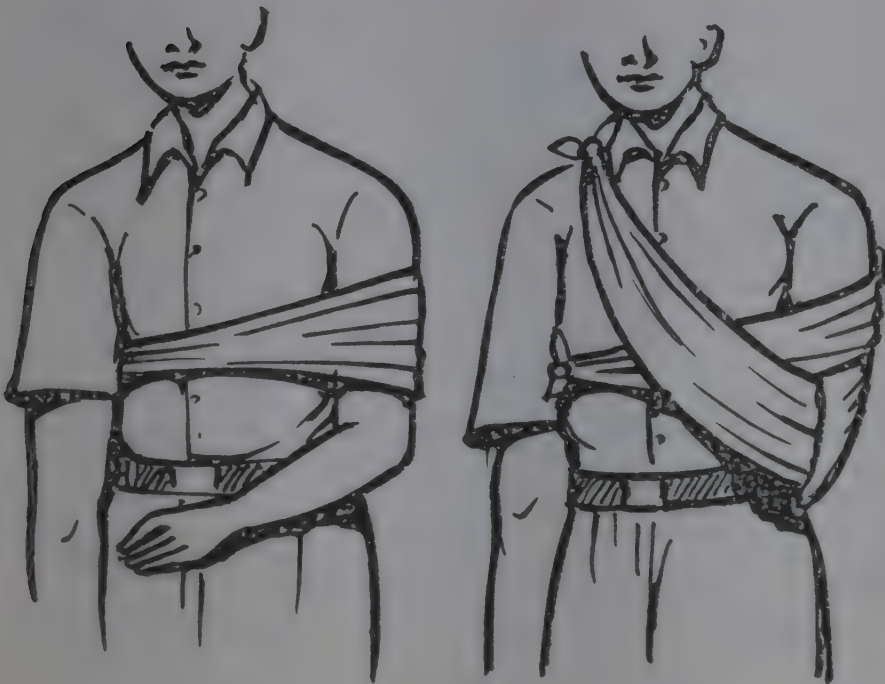


Fig. 62

7.6.7 *Fracture of the Shoulder-blade*

This fracture is very rare; it is caused by crushes and direct blows.

Management

1. Do not remove the casualty's coat or shirt.
2. Support the limb on the injured side in a sling.
3. Transport as a sitting case unless there is shock.

Fractures of the Upper Limb (Fig. 63)

1. *Fracture of the Arm-bone (Humerus)*

This is a difficult fracture to treat as the muscles produce bends and overlapping of ends that are broken.

Fracture occurs :

1. Close to the shoulder,
2. in the middle part, and
3. at lower end near the elbow, including the elbow joint.

Management

1. *Fracture of the upper end of Humerus.*

Place a pad of rolled handkerchief in the axilla lightly tie the arm to the chest. Bend the elbow and place the hand on the opposite shoulder and apply a collar and cuff sling.

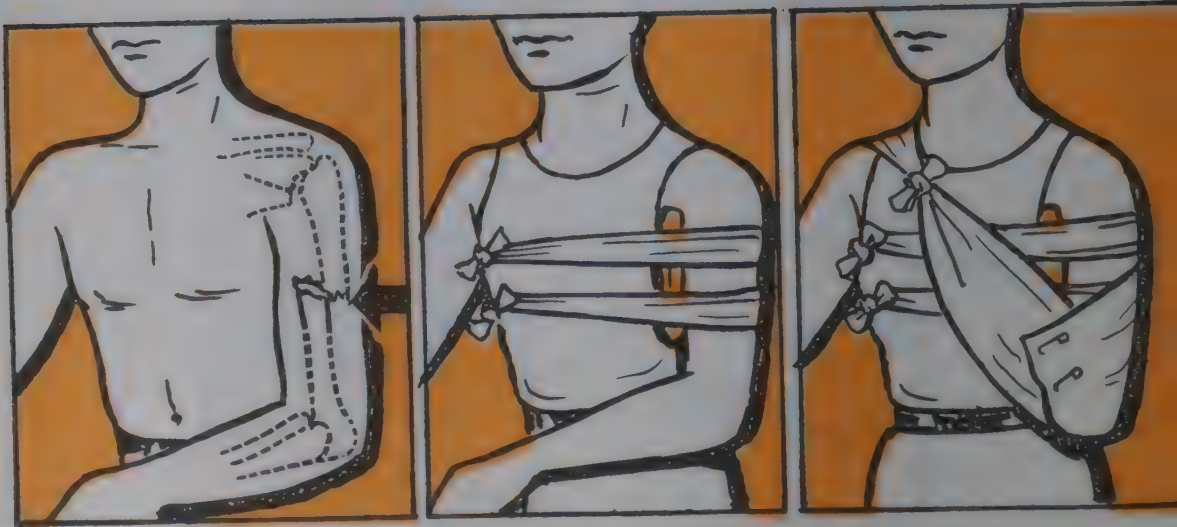


Fig. 63

2. *Fracture of mid shaft of Humerus.*

There is likelihood of shortening due to muscle pull. Stabilise the fracture by tying the arms to the chest wall—one bandage above and one below the fracture site. Support forearm in a sling.

3. *Fractures round the Elbow.*

- a. If elbow can be bent, strap arm to chest and support forearm in a triangular sling.
- b. If elbow cannot be bent, strap arm and forearm side of body in extended position.

Fracture of the Forearm

Shortening is not possible unless both bones are broken.

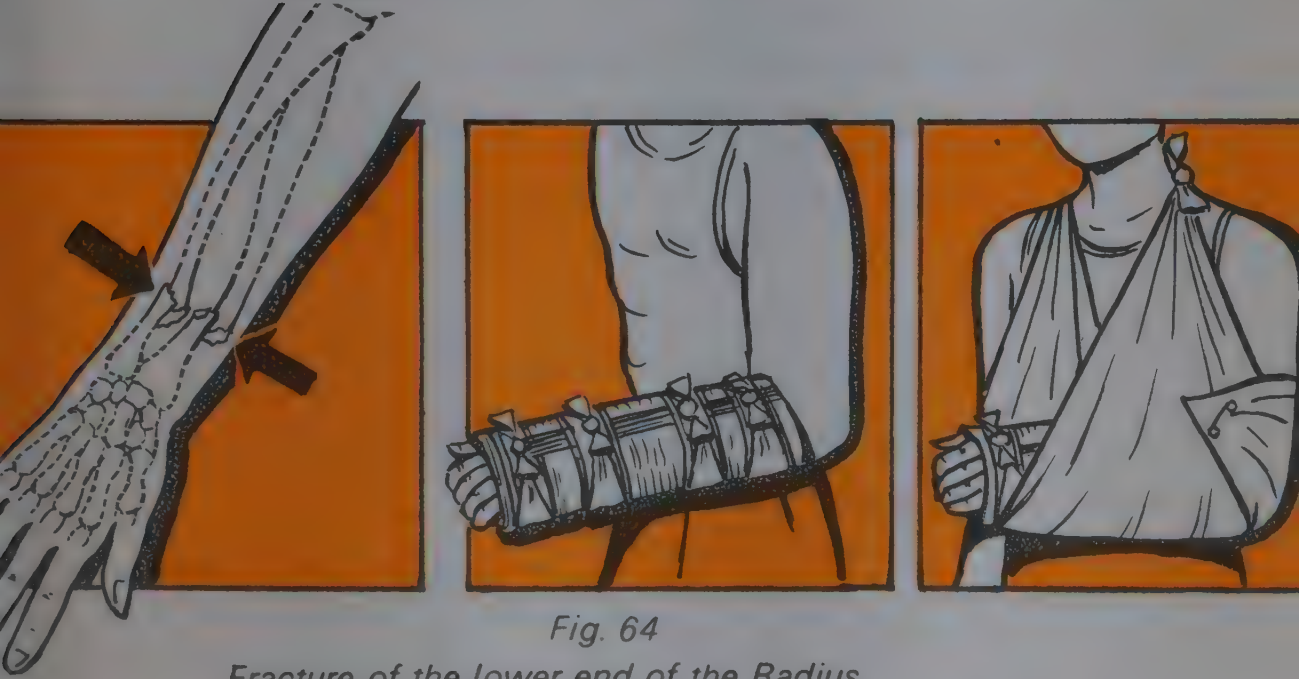


Fig. 64

Fracture of the lower end of the Radius

(Colles's fracture) is very common and is due to indirect force caused by fall on the outstretched hand. Care must be taken not to mistake it for a sprain of the wrist. There will be a considerable degree of deformity and swelling.

Splints in Fractures of the Forearm.

Forearm fractures are the only fractures where external splintage is necessary.

1. Place the forearm at right angles to the upper arm, and place it across the chest, the thumb facing upwards and the palm over the chest.
2. Roll a folded newspaper or other magazine round the forearm. The paper magazine should be from the elbow to the fingers.
3. Apply one bandage above the fracture and the other over the wrist first around it and then as a figure-of-eight including the wrist and hand.
4. Support the limb by a bread arm sling.

4. *Fractures of the Hand and of the Fingers:*

These are mostly due to direct injury. There may be severe bleeding into the palm.

7.6.8 *Fracture of the Pelvis* .(Fig. 65)

This is mostly due to direct force like fall of beams, crush accidents etc. Indirect force very rarely results in fracture of the pelvis, (as by a fall from a great height on the feet with the lower limbs held stiff). The bladder and urinary passages may also be injured producing grave complications.

Signs and Symptoms

1. Pain in the hips and loins increased by cough and/or movement.
2. Although the lower limbs are not injured the casualty will be unable to stand.
3. Internal bleeding is possible.
4. There will be difficulty in passing urine or he may not be able to make water although there is an urge to do so. Urine may be mixed with red or dark blood.

Management

1. Allow the casualty to lie in the position most comfortable to him—preferably on his back with lower limbs stretched.
2. Ask him to avoid passing urine.
3. a. If a hospital is near, transport on stretcher in the most comfortable position. No need to bandage.

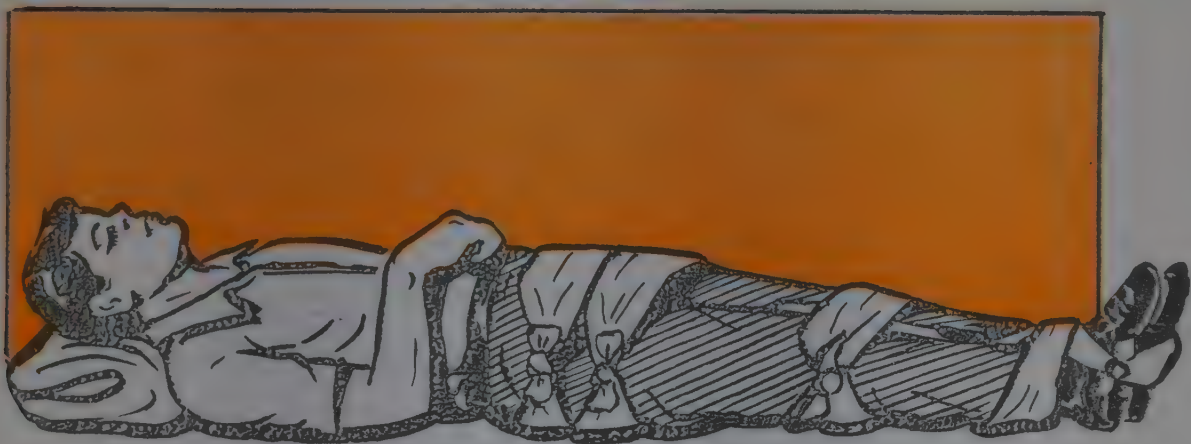


Fig. 65

- b. If the journey is long and on rough roads:—
 1. Place centre of a broad bandage on the hip joint of the injured side, pass one end round the pelvis and tie on the other side. Tie another broad bandage so that it overlaps the first by half its breadth and tie off similarly. The bandages should be firm but not too tight; avoid pressing the broken parts more inwards.
 2. Put pads between knees and ankles.
 3. Apply a figure-of-eight bandage around the ankles and feet and a broad bandage around the knees

7.6.9 *Fractures of the Lower Limbs : (Fig. 66))*

1. *Fracture of the Thigh-bone (Femur).*

- a. This bone could break at any place along its length.
- b. Fracture of neck of the thigh-bone occurs quite frequently in old people with small causes like tripping. Do not take it for a bruise of the hip, but suspect a fracture.
- c. Fracture of the thigh-bone is always serious because :
 1. great shock results from it;
 2. there will be bleeding into the surrounding tissues;
 3. healing is prolonged—specially in old people; and
 4. it can be a compound fracture, when it will be more serious.

Signs and Symptoms

1. Pain, swelling shock.
2. A shortening of the limb can be noted.
3. The foot on that side lies flat and turned to the outer side and may or may not be lifted by the casualty to upright position.

Management

1. Treat shock.
2. Immobilise the thigh by bandaging to the sound limb upto below knee with paddings below knees. If splint is easily available and expertise is there—
 1. Apply a well-padded splint between the legs from the crotch to the foot.
 2. Tie the feet and ankles to the splint with a figure-of-eight bandage.
 3. A long well-padded splint from the axilla reaching upto foot should be applied.
 4. Apply seven broad bandages at the following places—
 - a. Chest, below the arm pits.
 - b. Pelvis at the level of hip joints.
 - c. Both ankles and feet.
 - d. Both thighs above fracture if the shaft is broken.
 - e. Below the fracture, including both thighs.
 - f. Both legs
 - g. Both knees

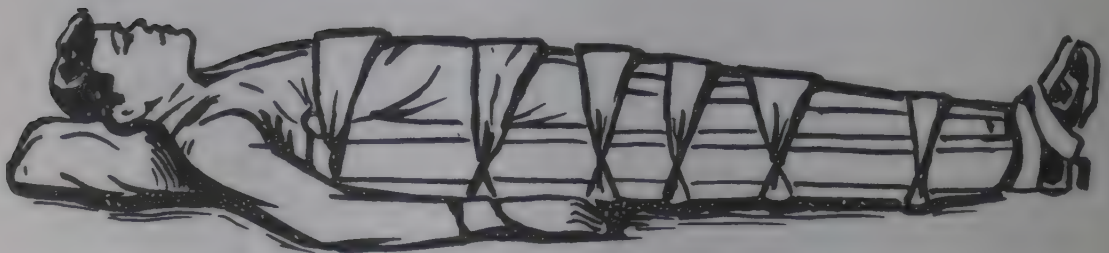


Fig. 66

2. Fracture of the Knee-cap

The knee-cap can be broken by direct force ; but usually the fracture is due to muscular force causing it to snap across into two bits.

Signs and Symptoms:

1. The limb is helpless as the important flexor muscle is out of action.
2. There will be lots of swelling and bleeding.
3. The gap between the two bits can often be felt.

Management

1. Lay the casualty flat with head and shoulders raised. The injured limb should be raised to an easy position. This will relax the thigh muscles, which pull the upper half of the broken bone upwards.
2. Tie to sound limb from thigh to below knee with padding between knees.
3. Apply a padded splint from the buttocks to beyond the heel. The ankle should be raised from the splint by pads.
3. a. Apply a broad bandage around the upper part of the thigh.
b. Apply a narrow figure-of-eight bandage around the ankle and foot.
c. Place a narrow bandage with its centre on the upper fractured piece, cross it behind the knee and bring it up over the lower fractured bit behind the knee and bring it up over the lower fractured bit and tie it off.
4. During transport also the limb should be kept raised on a box, blanket or similar material.

3. Fracture of the Leg

This is due to direct force, except when the lower part of fibula is involved (*Pott's fracture*).

1. One or both of the bones may be broken.
When the latter occurs, all signs of fracture are seen: pain, swelling, deformity, shock, etc. But when fibula only is broken no deformity is visible because it is splinted by the tibia.
2. Fracture of bones of ankle should be suspected in swellings around the ankle.

Management

1. The limb should be tied to sound limb with suitable

padding from thigh to ankle. Pads should be between knees and ankles.

2. Make a long well-padded splint and place it between the lower limbs extending from the fork to the feet.
3. Without causing disturbance or pain bring the two limbs close to the splint.
4. Placing additional pad between the ankle and knee, tie the feet and ankles with a figure-of-eight bandage.
5. Place a broad bandage at the upper part of the thighs.
6. Apply a broad bandage on the knee.
7. Finally apply two bandages of required size, one above and one below the fracture.

Naturally the bandages should be tied on the injured side; and note that if the fracture is near the ankle, one bandage should be omitted.

4. *Fracture of the Bones of the Foot & Toes*

This is caused by direct injury like a crush injury or a wheel passing over the foot. Suspect fracture when there is pain, swelling and loss of power.

Management

When there is a wound :

1. Remove footwear, cut or remove the socks.
2. Treat the wound. Use the other foot as splint. Tie the feet and legs together below knee with padding between ankles, feet and knee.
3. Apply a padded splint reaching from the heel to the toe over the sole of the foot.
4. *Bandage*
 - a. Place the centre of a broad bandage over the foot.
 - b. Cross the ends over the instep and carry them to the back of the ankle.
 - c. Cross once more to bring them to the front of the ankle.
 - d. Cross once more to bring the ends on the back of the ankle and tie it off.

5. Raise the foot to make the casualty feel comfortable.
 - a. If no wound is present or suspected and if the casualty wears shoes, do not remove them, secure as described above with a broad bandage and keep foot raised to a comfortable position.
 - b. But in India most persons wear chappals, quite a few do not have a footwear at all. In such cases treat as in the case of wounded crushed foot.
 6. Transport must always be as a stretcher case with foot raised.
-

INJURIES TO MUSCLES AND JOINTS

8.1 **Muscles and Tendons**

- 8.1.1 Muscles are the fleshy part of the body. They give the body its shape. All movements of the body are done with the help of muscles. There are two types of muscles : Voluntary and involuntary.
- 8.1.2 Voluntary muscles are found in the head, the neck, the limbs and the walls of the trunk. They are attached to the bones either directly or by white fibrous bands called tendons. Voluntary muscles are under the control of the will. Movements of the body take place by the contractions and relaxations of these muscles.
- 8.1.3 Involuntary muscles are found on the walls of the stomach and intestines, in the air passages, the blood vessels and the heart. They are not controlled by the will. They work under the influence of the set of nerves called the automatic nerves.

8.2 **Strains and Ruptures**

- 8.2.1 A strain is caused by overstretching of a muscle. It generally happens as a result of a twist or a sudden effort such as lifting a heavy weight. A few muscles or tendon fibres will be torn.
A rupture (or tear) is a more serious injury: an entire muscle bundle or tendon is torn across. The sudden pulling of the calf muscle is a common example of a rupture.
- 8.2.2 *Signs and Symptoms*
1. There is a sudden sharp pain at the muscle.
 2. The muscles may swell and feel stiff.
 3. In a rupture there is severe pain and the casualty cannot move the injured part.

8.2.3 *Aim of First Aid*

1. to reduce pain ;
2. to give rest and support to the part ; and
3. to get medical aid.

8.2.4 *Management*

1. Place the casualty in the position most comfortable to him.
2. Support the injured part. (Use a sling in case of an upper limb and a crutch or a stick for a lower limb.
3. Apply a cold compress (a handkerchief, towel, or a piece of cloth soaked in cold water and squeezed).
4. Get a doctor or take the casualty to a hospital. If he has to travel a long distance, immobilise the limb as in fracture.

8.3 **Joints**

8.3.1 The junction of two or more bones is called a joint. There are two types of joints: immovable joints and movable joints.

8.3.2 In immovable joints the bones are permanently fixed and no movement is possible. The several bones of the skull, for example, are firmly joined with each other and form immovable joints.

8.3.3 In movable joints two or more bones are held together by means of muscles, tendons and ligaments, and movement between the bones is possible. Three kinds of movable joints are found in the body:

1. Ball and socket joint: as found in the shoulder joint and the hip joint. In this case the round head of the bone enters the socket of another bone thus allowing free movement in several directions and planes.
2. Hinge joint: as in elbow and knee joints. These joints allow movement of the bones on one plane only (bending and extending) like hinge of a door.
3. Gliding joint: as in the wrist, the feet and also between the ribs and the vertebrae of the spinal column. These joints allow light movements only.

8.4 **Sprains**

8.4.1 A sprain is the tearing of the ligaments of a joint or the tissues round the joint. It is caused by a sudden wrench or twist at the joint. A sprain of the ankle is quite common.

8.4.2 *Signs and Symptoms*

1. There is pain at the joint.
2. There is swelling and later bruising.
3. Casualty cannot use the joint without increasing the pain.

8.4.3 *Aim of the First Aid*

1. to rest and support the injured part;
2. to reduce pain; and
3. to get medical aid.

8.4.4 *Management*

1. Place the limb in the position most comfortable to the casualty, preferably elevated.
2. Do not allow him to move the joint.
3. Apply a firm bandage to the joint. This will lessen pain and give support to the joint.
4. Wet the bandage with cold water and keep the bandage always wet.
5. Send for a doctor or take the casualty to the doctor in a conveyance. It is bad to walk.

Important

It is sometimes difficult to say whether the casualty has a sprain, dislocation or a fracture. When in doubt treat as a fracture.

8.5 **Dislocations**

8.5.1 A dislocation is the displacement of one or more bones at a joint. This happens to the shoulder joint (in adults) by a heavy fall on the hand, to the elbow joint (in children); to the lower jaw due to yawning or a blow on the chin, and to the thumb and fingers.

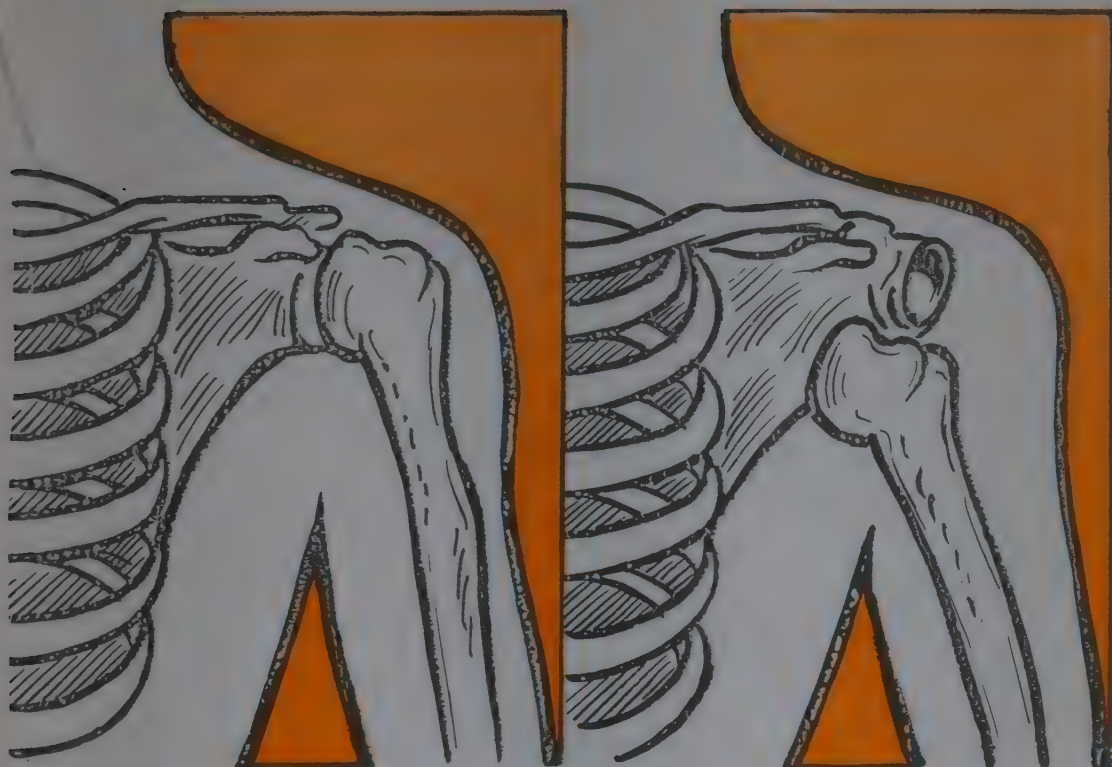


Fig. 67

8.5.2 *Signs and Symptoms*

1. There is severe pain at or near the joint.
2. The casualty cannot move the joint.
3. The joint looks deformed and the limb assumes an unnatural position.
4. Later there is swelling.

8.5.3 *Aim of First Aid*

1. to immobilise the joint;
2. to reduce pain; and
3. to get medical aid.

8.5.4 *Management*

In the case of the shoulder :

1. If outdoors, support the limb in the most comfortable position. Place a pad of folded newspaper or cloth between the arm and the body. Bandage the arm to the body, Take the casualty to the hospital.
2. If indoors, place the casualty on a bed in the posi-

tion most comfortable to him, support the limb on pillows or cushions.

In the case of the lower jaw :

3. Remove false teeth, if any.
4. Support the lower jaw by a bandage tied over the top of the head.

In the case of the elbow joint :

5. Apply a large arm sling and take the casualty to a hospital.

Important

Do not try to put the bone back in place.

NERVOUS SYSTEM AND UNCONSCIOUSNESS

9.1 The Nervous System

There are two systems of nerves working:

The cerebro-spinal and the Automatic, which together help to control and regulate all functions of the body.

9.1.1 The Cerebro-Spinal System

This is made up of the brain, the spinal cord and innumerable nerves. By its action sensations of heat, pain etc., are received at the brain and the 'Will' sends out messages so that proper muscular or gland actions take place. For example, if the skin is pinched, a sensation is conveyed to the brain and the 'Will' sends out messages to the muscles, which quickly withdraw the part pinched so that it can escape being pinched. All of us know that the pinching and withdrawing take place in a split second showing how sensitive and quick the reflex is.

The brain is situated within the skull. It is the great organ of *will, mind, intellect* and *storage* of all experiences past and present. It receives impressions or sensations from all over the body and our surroundings, via sensory nerves and reacts to them in a proper way through the motor nerves.

The spinal cord is the extension downwards of the brain into the spinal canal. (Fig. 57) Coming out of the skull through the foramen magnum, it extends up to the 2nd lumbar vertebra. It consists of nerve trunks and nerve centres, which are connected with the brain. The nerves come out of the brain and spinal cord in pairs and branch out to muscles, glands, and every part of the body. Like the Telegraph and Telephone lines, they carry messages to and from the brain. When a nerve is cut, the power to move and/or to feel will be lost in the affected region.

9.1.2 *The Autonomic System*

Unlike the Cerebro-Spinal system, this consists of 'nerve-cell-lumps' called ganglia which are interconnected with a complicated network of nerves. It controls the involuntary muscles and vital functions of the heart, lungs etc., and makes them work harmoniously. Its name indicates that this system is not under the control of the *will*, which means that it is acting always, whether awake or asleep.

9.2 **Unconsciousness (Insensibility)**

Any interference with the normal functioning of the brain and the nerves brings about loss of sensibility. An unconscious state indicates not only that there might be some disease or injury of the brain but serious injuries and diseases elsewhere in the body.

9.2.1 Unconsciousness due to injuries are of two kinds.

- a. partial when it is called stupor, and
- b. complete when it is known as coma.

9.2.2 *Tests for degree of unconscious state*

- a. When spoken to, the casualty may not respond. While in stupor he can be roused with difficulty, in coma there is no response at all.
- b. In stupor one cannot open the eye lids as the casualty will resist this attempt. But in coma lids can be opened without any resistance.
- c. *Pupil test*
Pupil is the round opening in the centre of the Iris. In stupor caused by diseases or injuries the pupil contract when light is made to fall on it. But in coma there is no response to light. In fact, it is often widely dilated in deep coma.

9.2.3 *Causes of Unconsciousness*

- a. Brain injuries
- b. Apoplexy
- c. Infantile convulsions
- d. Fainting
- e. Heat stroke or exhaustion
- f. Diabetes or over dose of insulin

- g. Heart attacks
- h. Hysteria
- i. Epilepsy
- j. Shock
- k. Haemorrhage
- l. Acute Fever
- m. Poisons

9.3

Management of Unconsciousness (General)

- a. See that there is a free supply of fresh air and that the air passages are free.
Take the casualty away from harmful gases, if any.
If inside a room, open doors and windows.
Remove false teeth.
Above all, keep back crowds: they only obstruct.
- b. Loosen clothings at neck, chest and waist.
- c. If the weather is cold, wrap blankets around the body.
- d. If breathing has stopped or about to stop turn the casualty into the required posture and start artificial respiration. (See Chapter 4)
- e. Breathing may be noisy or quiet, If not noisy, let the casualty lie on his back. Raise the shoulders slightly by a pad and turn the head to one side. Watch for some time. If breathing becomes difficult, or gets obstructed, change the posture to ease breathing. If breathing is noisy (i.e., the lungs are filled with secretions and the air passing through makes a bubbling noise) turn casualty to three-quarter-prone position (See Fig. 55) and support in this position with pads, (In a stretcher case, raise the foot of stretcher so that lung secretion drain easily).
- f. Apply specific treatment for the cause of unconsciousness.
- g. Watch continuously for any changes in the condition; do not leave the casualty until he is passed on to medical hands.
- h. No form of drinks should be given in this condition.
- i. It is best to remove the casualty to a sheltered place on a stretcher.

- j. On return to consciousness, wet the lips with water. If there is no thoracic or abdominal injury sips of water also can be given.

USUAL UNCONSCIOUS STATES

9.4 **Concussion**

Direct injury to the brain can cause one of two conditions: viz. concussion and compression.

- 9.4.1 Concussion is more a shake up of the brain as a whole, rather than an actual injury to the brain substance. It is caused by a blow on the head, fall from a height on the feet or on the buttocks, or even a blow on the point of the jaw.

9.4.2 *Signs and Symptoms*

- a. Loss of sensibility. This can be mild stupor or coma. Mild cases are attended with a "blackout" of short duration; or it may just be confusion. Stupor and coma are a result of serious shake-ups. It may lead on to compression. Therefore, there is a need for careful watching. In fact, no head injury case should be treated casually.
- b. At the time of recovery there is generally nausea and vomiting. Loss of memory for events before and after injury, are not rare.

Management

Follow the general rules laid down (13.3). The casualty should not be allowed to get back to work, unless advised by the doctor.

9.5 **Compression**

- 9.5.1 Compression is a more serious condition, where an actual pressure is produced on some part of the brain, like a blood clot or a fractured bone of the skull. A concussion may lead to compression. The casualty may not return to consciousness even after a day or more.

9.5.2 *Signs and Symptoms*

- a. At first there may be stupor, which may be followed by coma.
- b. Breathing will be noisy.

- c. Slow pulse and flushing of face are expected.
- d. Temperature may be raised. In the absence of a thermometer, the head being hot to the touch is enough to know this.
- e. The pupils may either be dilated or unequal in size
- f. Paralysis of one side or a part of the body if seen is a sure sign of brain injury.
- g. There may be convulsions in rare cases.

9.5.3 *Management*

General rules laid down above are to be followed (12.3). But it should be kept in mind that brain injury is a serious condition and requires urgent medical care.

9.6 **Apoplexy (Stroke)**

9.6.1 Apoplexy occurs in middle age and after, and in patients with high blood pressure. A diseased blood vessel in some part of the brain ruptures and the blood floods the brain tissue causing unconsciousness. A clot of blood caused by injury to brain may press upon a part of the brain tissue, thus stopping blood supply to the part. Lay people usually refer to it as a 'Stroke'.

9.6.2 *Signs, Symptoms and Management*

The signs are in a way similar to those of compression. The treatment is on the general lines given above (12.3.).

9.7 **Infantile Convulsions**

9.7.1 There are convulsions that occur in children. A condition that produces vomiting in an adult can cause convulsions in a child. Teething, stomach upset (most usual cause, especially when diet is changed) bronchitis or fevers are the common causes.

9.7.2 *Signs and Symptoms*

- a. Twitches of the limbs head and body.
- b. Paleness of the face (later blueness).
- c. Upturned eyes.
- d. Holding of breath with foaming at the mouth.

9.7.3 *Management*

- a. Follow the general steps laid down (12.3).
- b. Remember to keep the child warm.

9.8 **Fainting**

9.8.1 Fainting is very common. It is always due to reduced blood supply to the brain. Fear of an operation etc., fright, sad news, or pain can cause fainting. A sudden fall in blood pressure also can produce it. It may also develop slowly in weak persons or people staying for long period in hot or stuffy places, as in parades or stuffy rooms.

9.8.2 *Signs and Symptoms*

- a. Unconsciousness occurs either suddenly or the casualty may have giddiness for a second, the body crumbles into a heap and soon becomes unconscious.
- b. Face is pale (due to reduced blood supply to head or brain).
- c. Pulse is weak and slow.
- d. Breathing becomes less deep than normal.
- e. Skin is cold and sticky.

9.8.3 *Management Immediate*

- a. The moment the person feels faint get his head down quickly. If sitting, get the head between the knees and hold it there for a minute or two. It may be necessary to lay him down, with the head at a slightly lower level than the feet.
- b. Hold smelling salt, if available, in front of the nose.

Later

- c. If seen later, the casualty will have become unconscious. Lay him down as described above.
- d. See that there is plenty of fresh air; ask the on-lookers to disperse.
- e. Loosen clothing at waist, chest and neck.
- f. After recovery only slowly raise the head; then make him get up and sit down.
- g. Give sips of orange juice or tea or coffee or even water.

9.9 **Excessive Heat**

9.9.1.1 The effects of excessive heat are:

- a. Heat exhaustion.
- b. Heat stroke.

Both these conditions are caused by too high a

temperature in the atmosphere but the signs and symptoms as also the treatment are quite different. Therefore, they must be learnt and treated differently. Humid surroundings also add to the immediate occurrence of the conditions. Lack of body fluids and salt also, is an important factor.

9.9.2 *Signs and Symptoms*

Heat Exhaustion

- a. Headache, dizziness, slower onset, nausea, vomiting, occasionally abdominal cramps, collapse.
- b. Unconsciousness follows.
- c. Face pale with cold sticky sweat.
- d. Pulse : Weak.
- e. Temperature: normal or slightly high.
- f. Symptoms of shock.

Heat Stroke

- a. A dangerous condition coming on suddenly. But it may follow untreated exhaustion.
- b. Unconsciousness rapid, but may come up after headache.
- c. Vomiting, face flushed, skin hot and dry.
- d. Pulse : full and bounding.
- e. Temperature: Rises rapidly upto 107° F, or even higher.
- f. Death will occur soon if temperature is not lowered soon.

9.9.3 *Management*

1. *Heat Exhaustion*

- a. If the casualty is unconscious, follow the general rules (12.3).
- b. If the casualty is conscious, remove him to a cool place, give him plenty of salted water ($\frac{1}{4}$ teaspoon of salt to a tumbler of water) keep him comfortably warm. Watch him carefully and be prepared to treat if he develops heat stroke.

2. *Heat Stroke*

We have to bring down his body temperature quickly. Keep the casualty in the coolest possible place. Remove clothing and sprinkle cool water (if possible iced water) on his body or wrap him in a thin wet sheet and fan him. The temperature

begins to fall, but it should not get lower than 102° F. After this stage is reached wrap him in a dry sheet and keep fanning so that the temperature does not rise up again. On recovery treat as for heat exhaustion.

9.10 **Diabetic Coma and Over-dose of Insulin**

9.10.1 *Signs and Symptoms*

Diabetic Coma

- a. Skin dry
- b. Breathing deep and sighing.
- c. May smell of acetone (mostly apple smell).
- d. Unconsciousness deep or stupor only.

Over-dose of Insulin

- a. Skin moist with sweating.
- b. Shallow and quiet.
- c. No smell of the sort.
- d. Fainting — rarely unconsciousness.

9.10.2 *Management*

For Coma follow general rules (12.3): but send for the doctor at once.

Insulin over-dose: Feed with glucose water or sweets or jams.

9.11 **Heart Attacks**

9.11.1 Heart attacks are caused by lack of blood supply to the heart itself. It comes on suddenly — sometimes after physical effort, but generally not so.

9.11.2 *Signs and Symptoms*

There may be an earlier history. Face is pale. He feels pain in the left chest or the pit of the stomach. Pain may extend to side of arm or up in the throat. Vomiting and sweating profusely are always present.

9.11.3 *Management*

Do not disturb the casualty unduly. Send for doctor immediately. The casualty needs to be taken to a hospital/doctor at once and by quickest means. Do not let him walk or sit up. Lift him and carry if possible in lying or back resting position. Support him in the sitting posture so that the strain on the heart is less. Loosen tight clothing so that he breathes freely.

9.12 **Epilepsy**

9.12.1 Epilepsy is a disease of the young, usually. In the

beginning the attacks of convulsions are rare, but they become more and more frequent later. The casualty hurts himself when he falls down.

- a. In minor Epilepsy the casualty becomes pale, his eyes become fixed and staring and he becomes unconscious for few seconds. He resumes his work soon, as though nothing had happened. Watch the casualty for development of a major attack, if any. Treat as for fainting.
- b. Major Epilepsy is a serious matter. The attack always follows headache, restlessness or a feeling of dullness. The casualty is aware that immediately he is going to get an attack of epileptic fits.

The fit itself has the following four phases :

- a. Sudden loss of consciousness, which makes him fall to the ground. He may cry or scream.
- b. The body becomes rigid for a few seconds. The face is flushed.
- c. The fits begin in full force; the casualty may injure himself by striking against hard or sharp objects. There is frothing at the mouth and he may bite his tongue. He may pass urine and motion, as these get out of control.
- d. The attack lasts for a few minutes, the convulsion stops, The casualty is dazed and confused. He may act in a strange manner without knowing what he is doing. After some time he becomes normal.

9.12.2 *Management*

- a. Just keep the casualty under control; do not use force to stop the convulsions. Remove objects that may cause injuries.
- b. Prevent biting of tongue by inserting a spoon wrapped in a hand kerchief near the back teeth, when the jaws are relaxed.
- c. Wipe froth from the mouth.
- d. Follow the general rules for treating unconsciousness (12.3).
- e. Watch for recurrence, if any. Leave the casualty after making sure he is aware of his surroundings. Advise him to see a doctor.

9.13 **Hysterical Attacks**

9.13.1 Rarely does a first aider need to attend to these cases. Although women are prone to it, men also have these attacks. Emotional or mental stress brings on the attacks.

9.13.2 *Signs and Symptoms*

- a. Loss of control of emotions rigidity of the body and seeming unconsciousness.
- b. Convulsions. But these are not typical.
- c. He may shout or cry, tear his hair, keep the eyes lightly closed when 'unconscious'. He requires an audience!
- d. He falls down deliberately, so that no injury is caused to any part of the body. He does not fall if he is alone.
- e. The situation is difficult to diagnose. First aider should find out the background of the casualty by enquiries to decide that it is hysteria.

9.13.3 *Management*

- a. Ignore the attack.
 - b. Be firm in dealing but kind.
 - c. After recovery, i.e., control of his activities is gained, give him some work to do.
-

BURNS & SCALDS

10.1 Causes of Burns and Scalds

- 10.1.1 Burns are injuries that result from dry heat like fire, flame, a piece of hot metal, or the sun, contact with wire carrying high tension electric current or by lightning or friction. Scalds are caused by moist heat due to boiling water, steam, oil, hot tar, etc.
- 10.1.2 Chemical burns are caused by strong acids (example sulphuric Acid, Nitric Acid) or by strong Alkalies (Caustic Soda, Caustic Potash, quick lime or strong Ammonia).
- 10.1.3 A Nuclear burn is caused by the instantaneous flash of intense heat given off by a nuclear explosion. It is capable of causing superficial burns on the exposed skin of persons several miles away.

10.2 Degrees of Burns

- 10.2.1 The degree of burns indicate the degree of damage to the tissues. There are three degrees of burns:—
 First degree:—When the skin is reddened,
 Second degree:—When there are blisters on the skin,
 and
 Third degree:—When there is destruction of deeper tissues and of charring.
- 10.2.2 The danger from burns depends on the area of the burns rather than the degree. Superficial burns over a large area of the body are more dangerous than the complete charring of a part of a limb. It must be noted that in the same person, different parts of the body may show different degrees of burns.
- 10.2.3 *Rule of Nine for areas of burn.*
 Any burn of over 30%—irrespective of deep degree—should be hospitalised as priority.
- 10.2.4 The first two degrees are seen in scalds also.
- 10.2.5 When the chemicals fall on skin or cloth worn by the person, any of the three degrees of burns may be

produced. When swallowed, the chemicals, if strong, will damage the tissues with which they come into contact while swallowing viz., lips, tongue, throat, food passages, stomach. There may be damage to the skin around the mouth.

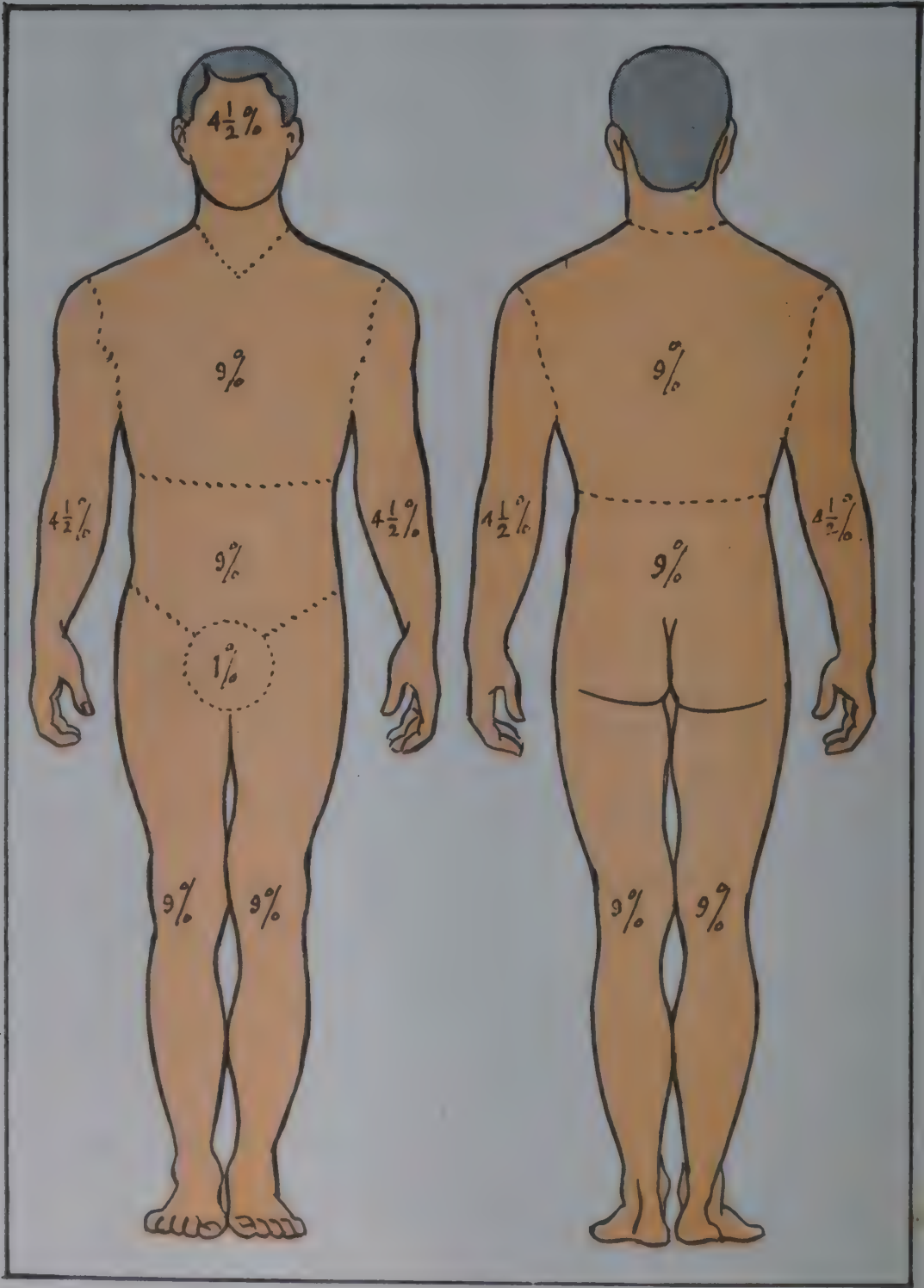


Fig. 68

10.3 **Dangers due to fire**

10.3.1 *Helping a person whose clothes have caught fire.*

The First Aider should know how to deal with a person whose clothes have caught fire.

1. Put out the flames by whatever means available. Most of the causes of burns occur in homes and drinking water is readily available to quench the flames, water also cools the burnt area causing less damage to occur.
2. Do not allow the person to run about. This only fans the fire and makes the flames spread.
3. Hold a rug, blanket, coat or table cover in front of you, while approaching a man whose clothings have caught fire.
4. Lay him down quickly on the ground and wrap tightly with any thick piece of cloth, rug or coat. Smother the flame by gently rolling the casualty or by gentle pats over the covering.
5. If the clothes in front of the body have caught fire, lay him on his back and vice versa, till suitable material is brought to smother the flame.

10.3.2 *Rescuing persons from fire*

1. In rescuing persons from a room which has caught fire, speed and clear thinking are required.
2. Remember, clean air is at ground level. So crawl along the floor to pull out a person who is lying unconscious or is disabled.
3. Have a wet kerchief round your face when you go for rescue.
4. If there is Carbon Monoxide in the room, these precautions do not protect the rescuer from Carbon Monoxide poisoning. When there is fire in a closed room, there is always some amount of carbon monoxide; therefore quick action is all important.
5. When there is fire in a room in which the doors and windows are closed, do not open the windows and doors to let in air. The rush of air will increase the fire and it will burn more intensely.

10.4 Results of Burns

Immediate :

1. Intense pain
2. Shock

Later :

3. There may be infection in the damaged area.
4. After healing, it will leave scars causing disfigurement and/or restriction of movements.

10.5.1 *Management of serious burns and scalds:—*

Immediate attention that is required in serious burns are :—

1. Keep the casualty quiet and reassure him.
2. Wrap him up in clean cloth.
3. Do not remove adhering particles of charred clothing.
4. Cover burnt area with sterile or clean dressing and bandage. In case of burns covering a large part of the body, it is sufficient to cover the area with a clean sheet or towel.
5. Keep him warm but do not overheat him.
6. If the hands are involved, keep them above the level of the victim's heart.
7. Keep burned feet or legs elevated.
8. If victim's face is burnt, sit up or prop him up and keep him under continuous observation for breathing difficulty. If respiratory problems develop, an open airway must be maintained.
9. Do not immerse the extensive burned area or apply ice-water over it because cold may intensify the shock reaction. However a cold pack may be applied to the face or to the hands or feet.
10. Shift the casualty to the nearest hospital if he is fit to be moved.
11. If you cannot take him to a hospital, wait for the doctor to arrive.
12. Do not open blisters.
13. Keep him wrapped up in clean cloth.

14. Treat for shock.
15. Remove quickly from the body anything of a constricting nature like rings, bangles, belt and boots. If this is not done early, it would be difficult to remove them later as the limb begins to swell.
16. If medical help or trained ambulance personnel cannot reach the scene for an hour or more and the victim is *conscious and not vomiting*, give him a weak solution of salt and soda at home and en-route:—one level teaspoonful of salt and half level teaspoonful of baking soda to each quart of water, neither hot nor cold. Allow the casualty to sip slowly. Give about 4 ounces to adult over a period of 15 minutes; two ounces to a child between 1 and 12 years of age and about one ounce to an infant under one year of age. Discontinue fluid if vomiting occurs. Do not apply ointment or any form of grease or other home remedy.

10.5.2 *Management of minor Burns and Scalds*

In the case of minor burns:

1. Clean the area gently with clean water.
2. Submerge the burned area in cold water.
3. Apply a solution of salt and water (one teaspoonful to a pint of water) in out of the way places.
4. Cover with dry dressing.
5. Do not apply cotton wool direct to the burnt.
6. Do not apply any greasy substance.
7. Give warm drinks for example sweetened tea or coffee.

10.5.3 *Management of Chemical Burns*

1. Wash off the chemical with a large quantity of water by using a shower or hose if available as quickly as possible. This flooding with water will wash away most of the irritant.



Fig. 69

2. Cut out contaminated clothing.
3. Do not touch the burnt area with bare fingers.
4. Treat as for burns.

10.5.4 *Burns of the Eye*

Acid Burns

1. First aid for acid burns of the eye should be given as quickly as possible by thoroughly washing the face, eyelids and the eye for at least five minutes.
2. If the casualty is lying down, turn his head to the side, hold the eyelids open and pour water from the inner corner of the eye outward. Make sure that the chemical does not wash into the other eye. Cover the eye with a dry, clean protective dressing (do not use cotton) and bandage.
3. Caution the victim against rubbing his eye.
4. Get medical help immediately (preferably an eye specialist).

Alkali Burns

Alkali burns of the eye can be caused by drain cleaner or other cleaning solution. An eye that first appears to

have only a slight surface injury, may develop deep inflammation and tissue destruction, and the sight may be lost.

5. Flood the eye thoroughly with water for 15 minutes.
6. If the casualty is lying down, turn his head to the side. Hold the lids open and pour water from the inner corner outward. Remove any loose particles of dry chemicals floating on the eye by lifting them off gently with a sterile gauze or a clean handkerchief.
7. Do not irrigate with soda solution.
8. Mobilize the eye by covering with a dry pad or protective clothing. Seek immediate medical aid.

8.6 **Prevention of Burns**

Most of the conditions under which burns occur can be prevented.

1. Women and children get burnt more often than men; women get burnt while cooking in the kitchen. They should take the following precautions:
 - a. Ovens or stoves should be kept at a higher level, about 2 feet above the ground.
 - b. While working near fire, see that your clothes are not hanging free, or flapping about.
 - c. Never go near fire when wearing material made out of nylon or similar fibres as these clothes catch fire easily and quickly. It is a good practice to use a cotton overall while cooking.
 - d. Never put kettles or other vessels with hot liquids near the edge of a stove, sink or table or the short pointing towards you.
 2. Never leave children alone in a room where there is a fire or a naked lamp burning.
 3. Keep matches out of the reach of children.
 4. Never sleep with a kerosene lamp near the bed.
 5. Do not hang clothes near an open fire.
-

POISONING

11.1 Poisons

Some substances when taken into the body in fairly large quantities can be dangerous to health or can cause death. Such substances are called poisons. They may be taken with a view to committing suicide, or may be given to persons by enemies deliberately, or taken by mistake.

11.2 *Methods of poisoning*

Poisons get into the body

- a. by swallowing
- b. by breathing poisonous gases, or by injection.

11.2.1 *Poisoning by swallowing*

Sometimes acids, alkalies, disinfectants etc., are swallowed by mistake. They burn the lips, tongue, throat, food passage and stomach and cause great pain. Other swallowed poisons cause vomiting, pain and later on diarrhoea. Poisonous fungi, berries, metallic poisons and stale food belong to the latter group. Some swallowed poisons affect the nervous system. To this group belong (a) alcoholic drink (methylated spirit, wine, whisky etc.) when taken in a large quantities, and (b) tablets for sleeping, tranquilizers, and pain killing drugs (asprin or 'largectil). All these victims must be considered as seriously ill. The symptoms are either delirium or fits or coma (unconsciousness). Some poisons act on nervous system — (belladonna, strychnine).

11.2.2 *Poisoning by gases*

Fumes or gases from charcoal stoves, household gas, motor exhausts and smoke from explosions etc., cause choking (asphyxia) which may result in unconsciousness in addition to difficulty in breathing.

11.2.3 *Poisoning by injection*

Poisons get into the body through injection, bites of

poisonous snakes and rabid dogs, or stings by scorpions and insects. Danger to life is again by choking and coma.

11.3 First Aid in Poisoning

1. Poisoning is a serious matter. Patient must be removed to a hospital/or a doctor be sent for at once with a note of the findings and, if possible, the name of the poison.
2. Preserve packets or bottles which you suspect contained the poison and also any vomits, sputum etc., for the doctor to deal with.
3. If unconscious
 - a. Do not induce vomiting.
 - b. Make the casualty lie on his back on a hard, flat bed without any pillow and turn the head to one side. As there is no pressure on the stomach and the gullet is horizontal, the vomited matter will not get into the voice box and the tongue will not close the air passage. This is also the best posture for giving artificial respiration, if needed.
 - c. Sometimes when there is excess of vomiting the three-quarter-prone posture (i.e., the casualty is made to lie on his side with one leg stretched, the other bent at knee and thigh) will make things easier for the casualty.
 - d. If breathing is very slow or stopped, start artificial respiration and keep it up till the doctor comes.
4. If conscious
 - a. Aid vomiting by tickling the back of throat or make him drink tepid water mixed with 2 table-spoons of common salt for a tumbler of water.
 - b. Even if conscious, when the poison is a corrosive *do not induce vomiting*. Signs of corrosives: Lips, mouth and skin show grey white or yellow, patches which are to be looked for; acids, alkalies etc., cause such burns.

Management

Factories which use certain poisons shall have the respective antidotes ready and displayed in an easily available place. The personnel should be taught about the use of antidotes — so that anyone can render assistance in case of emergency.

5. The poison must be diluted by giving large, quantities of cold water (iced, if possible). This will dilute the irritant and delay absorption and will replace fluid lost by vomiting. Tender cocoanut water will be even better as this will be even better as this will be a food and also a diuretic.
6. Soothing drinks should be given. Milk, egg beaten and mixed with water or sojee congee are good for the purpose.

11.4 **Some common Poisons and First Aid for them**

Some common poisons and their management is given below :

NOTE:

1. For children between two and eight years of age: one half of the quantity mentioned should be given.
2. For infants under two years: one quarter of the quantity is sufficient.
3. When it is said that vomiting is to be induced, it is assumed that the casualty is conscious.

<i>Poison</i>	<i>Source</i>	<i>First Aid</i>
Arsenic	Rat poisons, weed killers, arsenic itself.	Induce vomiting. Give soothing drinks.
Asprin	Asprin Tablets	Induce vomiting. A drink of soda bicarb (one tea-spoon to a tumbler of water) to be given. Also give strong coffee or tea.
Carbon-monoxide	Charcoal Stove Gas Stove Exhaust gases of cars	Apply artificial respiration. Give oxygen (available in Centres, Garages and some chemists).

Sleeping Tablets	Chemists	Induce vomiting. Give Mag. Sulph (2 tea-spoons in water). Give hot coffee. Keep him awake.
Mercury	Calomel Teething Powders Mercury itself	Give white of egg in water. Later give milk. Then induce vomiting.
Lead	Paints Hair dyes	Induce vomiting. Then give Mag. sulph in water.
Opium and Morphia	Hospitals Some mixtures Opium Eaters	Put a few crystals of potassium permanganate in a tumbler of water; give as a drink. Give hot coffee. Keep the patient awake.
Petrol Paraffin Kerosine Oil	Houses Garages Industry	Induce vomiting. Give a large quantity of water or tender coconut. Liquid Paraffin if available is preferable to water in cases of Kerosene oil poisoning.
Phosphorus	Rat poisons and match heads	Induce vomiting. Give a large quantity of water or tender coconut. <i>Note:</i> Never give oils as they will dissolve phosphorus and increase the effect of the poison.
Prussic acid	Used in Photography and Electroplating Oil of bitter almonds Tender Bamboo shoots	It is an emergency: Act at once. Induce vomiting. Begin artificial respiration.

Strychnine	Some vermin killers and also to kill straydogs.	Induce vomiting if there is no spasm. If breathing stops, give artificial respiration.
Follidol	Used for bug destruction and cockroach destruction.	Induce vomiting. Give water or tender cocoanut. Start artificial respiration, if needed.
Insecticides and weed killers	Agriculture	Symptoms: Giddiness, blurred vision, choking in chest (slow pulse, contracted pupils, sweating, blue lips, convulsions) Give artificial respiration till doctor comes.
Acids (strong)	Hospitals, Laboratories, Garages, Industries.	Must not be made to vomit. Dilute acid with large quantities of water of tender cocoanut. Better add soda bicarb, chalk or milk of magnesia to water.
Alkalies (strong)	Hospitals, Laboratories, Industries, Ammonia, slaked lime (chunam)	Must not induce vomiting. Give water or tender cocoanut in plenty. Better add orange or lime juice to it.
Disinfectants: Carbolic acid, homes Phenyle, Lysol, Dettol, Iteol	Hospitals and	Do not induce vomiting. Give 4 spoons of Mag. Sulph in a litre of water.

MISCELLANEOUS CONDITIONS

FOREIGN BODIES IN THE EYE, EAR, NOSE, ETC.

12.1 Foreign body under the skin.

12.1.1 Thorns, glass, iron pieces, needles, etc., get under the skin.

11,1 2. Treatment

1. Unless very easy to deal with, don't interfere.
2. Dress the wound.
3. Immobilise the part with splints and get medical aid.

12.2 Foreign body in the Eye

12.2.1 Wings of insects, dust, coal (hot from steam engines) metal particles from Lathes and loose eye-lashes are common object which get lodged under the eyelids. They cause pain and later redness, if they are not removed at once. Sometimes iron particles and wood splinters get lodged in the cornea causing serious trouble. Penetrating foreign bodies, however, are a danger to the eye itself.



Fig. 70



[Fig. 71]

12.2.2 *Management*

1. Avoid rubbing the eyes. In case of a child, tie his hands at the back.
2. Seat the casualty so that light falls on the eye. Pull the lower lid down. If the foreign body is floating and not embedded, remove it with a narrow, moist swab. The corner of a handkerchief twisted to a fine point will also do.
3. If foreign body is not visible it may be under the upper eye-lid. Ask the casualty to keep clean water in the hand and blink briskly in the water. If unsuccessful, pull the upper lid forward, push the lower lid upwards and let go of both the lids. The lashes of lower lid usually dislodge the foreign body. Try this two or three times.
4. If the foreign body is embedded in the eye, parti-



Fig. 72

cularly the cornea (the black of the eye) don't touch it — apply a soft pad, bandage the eye, ask the casualty not to rub the eye and take him immediately to a hospital.

5. Penetrating foreign bodies are easily made out by bleeding, pain, etc., it is for the doctor to handle. You just put a pad and bandage.
6. When corrosive acid, alkali or juices from plants are suspected, blinking eyelids under water a number of times or flushing with large quantity of water is the best thing to do. Then apply a soft pad, tie a bandage (not tightly) and take the casualty to the hospital at once.

12.3 Foreign body in the External Ear

1. If it is an insect, fill the ear with glycerin or coconut/ mustard oil or warm salt water. The insect will

float up and can be removed easily.

2. If there is nothing floating up, leave it alone, don't meddle at all but take him to a doctor.

12.4 **Foreign body in the Nose**

1. Do not interfere with the foreign body.
2. Make casualty breathe through the mouth.
3. Take him to the hospital. If a child, tie the hands behind so that he does not interfere with the foreign body.

12.5 **Foreign body in the Throat**

1. Some small objects like a safety pin sometimes get stuck in the throat. A draught of water is all that is needed to pass it further down.
2. Some irregular objects, fairly large, get stuck. If visible they can be taken out with the fingers. If a child, hold it up, head downwards and tap on back of neck, the foreign body will fall out.
3. Fish-bone or thorn get lodged by piercing some part of the throat. Keep the relatives and the casualty quiet and remove the casualty to the hospital at once.

12.6 **Foreign body in the Stomach**

Smooth objects like coins, buttons, nuts, safety pins are swallowed.

1. The stomach and intestines will adjust themselves in such a way as to throw them out.
2. Don't panic.
3. Show the case to a doctor.
4. There is no need to give laxatives (or bananas as is usually done).

12.7 **Cramp**

- 12.7.1 An involuntary contraction of a muscle is called cramp. This may happen during exercise or by chilling. It may also occur due to loss of water from the body as in cholera, excessive vomiting etc. The muscles of the calf of the legs, the hands, the feet or of the thighs may get so cramped.

12.7.2 **Management**

1. Stretch the shortened muscle.
 - a. *In the calf:* Straighten the knees with your hands draw the foot up towards the shin. Or straighten the toes and make party stand on the ball of his foot.
 - b. *In the hand:* Straighten out the fingers with gentle force.
 - c. *In the foot:* Stretch the toes towards the shin.
 - d. *In the thigh:* Straighten the knee and push the thigh forward.
2. Massage the affected part and apply warmth.
3. If there has been loss of water from the body, give drinks of water to which common salt is added (one teaspoon to one tumbler of water).

12.8 **Winding**

12.8.1 'Winding' is the result of a blow on the abdomen. The victim may collapse because the solar plexus (part of the autonomous nervous system which lies behind the stomach) is affected.

12.8.2 **Management**

- a. Lay the patient flat.
- b. Loosen all clothing,
- c. Draw his knees and thighs up and gently massage the abdomen.

12.9 **Stitch**

12.9.1 Stitch is a painful spasm of the diaphragm. It happens during games and running.

12.9.2 **Management**

1. Rest the patient.
2. Give him sips of hot water.
3. Gently rub the affected side at the back.

12.10 **Locked Knee**

12.10.1 The displacement of the semilunar cartilage of the knee is called a locked knee. This happens when a strong kick is missed or when the body is violently twisted with the man standing on one leg.

12.10.2 *Signs and Symptoms*

- a. There will be severe pain in the knee.
- b. The person may fall to the ground.
- c. The joint may become swollen.

12.10.3 *Management*

- a. Protect the knee joints with soft padding.
- b. Apply a firm bandage on the knee.
- c. Take him to the hospital.

12.11 **Snake Bite**

12.11.1 There are more than 2,500 different kinds of snakes. Only about 200 of them are venomous. All snake-bites are not fatal. Only a very small quantity of the venom might have been injected. Most people die not because of the venom, but from fear.

12.11.2 *Aim of First Aid*

- a. To reassure the person.
- b. To stop spreading of the venom.
- c. To obtain medical aid.

12.11.3 *Management*

- a. Lay the patient down, give him complete rest. calm and reassure him; never make him walk.
- b. If the bite is on the arm or leg, apply a constrictive bandage on the heart side of the bite tight enough to obstruct and stop the flow of the venom to all parts of the body. Don't tie it too firmly.

Wound

- c. Wash the wound with soap and water. Flush the wound with a lot of water.
- d. Cover the wound with a sterilised dressing.
- e. Get medical aid or send the person on a stretcher to the hospital as quickly as possible.

Should breathing fail, commence artificial respiration

12.12 **Dog Bites**

12.12.1 Dog bites are sometimes very serious. They may cause infection. If the animal is suffering from rabies, it will be transmitted to the person. The condition is known as Hydrophobia. The dog should not be killed.

It must be chained, and kept under observation for ten days. If the dog is healthy after this period, there is no danger of rabies.

12.12.2 *Aim of First Aid*

- a. To prevent rabies or other infections.
- b. To get medical aid.

12.12.3 *Management*

All dog bites must be treated as potentially bite by a rabid dog.

- a. Wipe the saliva away from the wound.
- b. Wash the wound thoroughly with plenty of soap and water,
- c. Cover the wound with a dry, sterile dressing. Do not put carbolic acid, nitric acid etc., on the wound, within $\frac{1}{3}$ hour of bite (if possible).
- d. Get medical aid or send the patient to the hospital for proper treatment of the wound and also the casualty.

12.13.1 **Stings of Mites, Ticks and Leeches**

- 12.13.1 Mites, Ticks and Leeches are found in marshes and jungles. They attach themselves firmly to the skin. Mites and Ticks may carry typhus and may transmit it to the person. Leeches are normally harmless, but they suck blood from the victim.

12.13.2 *Management*

- a. Don't try to remove the insects manually, their mouth parts may remain in the skin and may cause inflammation and infection.
- b. Put the burning end of a cigarette to the body of the ticks and leeches. They will fall off.
- c. Application of salt results in leech dropping off.
- d. Mites are so small that they can't be easily seen to be removed.
- e. Clean the area with methylated spirit.
- f. Apply weak ammonia or bicarbonate of soda or antihistamine ointment. This will relieve irritation.

12.14 **Stings of Bees, Wasps, Fleas and Hornets.**

- 12.14.1 The stings of bees, wasps, etc., can cause a lot of pain. The area may swell. Sometimes the person may suffer from shock.

Management

- a. A sting should be removed with forceps, or with the tip of a sterilised needle.
- b. Apply weak ammonia or bicarbonate of soda or antihistamine ointment to the area. This will relieve the pain.

12.15 **Frost-Bite**

- 12.15.1. If the body is exposed to wind in very cold weather frost bite may result. It is common in cold countries with snow and blizzards.

12.15.2 *Signs and Symptoms*

- a. The ears, nose, chin, fingers and toes lose their feeling and power of movement.
- b. The victim feels very cold. The affected parts will be painful and stiff.
- c. If immediate treatment is not given gangrene or death of the tissues may occur.

12.15.3 *Aim of First Aid*

- a. To give the victim shelter from the weather.
- b. To restore circulation.
- c. To get medical aid.

12.15.4 *Management*

- a. Remove rings, boots, gloves and anything else which may constrict circulation.
 - b. Do not heat by hot water bottles, fire or friction.
 - c. Cover the affected area to keep it warm, never rub the affected parts.
 - d. Give sips of coffee or tea with a little whisky or brandy.
 - e. Take the victim to a hospital as quickly as possible.
-

APPROACH TO A CASUALTY

The First Aider may be called upon to deal with anything from a cut finger to a major disaster. There is often confusion and panic after an accident because nobody knows what to do first, or indeed what comes second and third. The First Aider must accept responsibility. The Order of Priority is:

Danger to the Patient

The First Aider must make sure that there is no further danger to the patient or to himself:

In the case of Road accidents: by getting some one to control traffic.

In the case of Electrocution: by switching off the current after taking necessary precautions against electric shock.

In the case of Collapsible Buildings: or poisonous fumes by moving the patient and himself.

The Urgent Need of the Patient

Breathing

Check that his airway is open and he is breathing—
if not start resuscitation.

Bleeding

Check for serious bleeding and control it.

Broken Bone:

Immobilise all serious fractures and large wounds before moving the patient.

Burns and other conditions:

Give appropriate treatment.

Immediately it is decided that an ambulance is required, send for it, stating—

the exact place, if necessary with directions how to get there;

the number of patients;
some indication of the type and seriousness of the accident,
e.g., nature of injury, poisoning.
Send for a doctor—in cases of suspected fracture of the spine
or heart attack in the home.

Diagnosis

After attending to vital needs which have priority, find out what happened—

This information in itself may enable you to make a diagnosis, e.g., he swallowed half a bottle of disinfectant. It may greatly assist the doctor who has to deal with your patient.

If the patient is conscious—ask him where he is hurt; try to pinpoint the place; this will often identify the site of a fracture; you can then examine such parts with special care.

When he has told you of all the places where he feels pain make sure he is not injured elsewhere.

Ask him if he feels anything else wrong.

Examine the patient carefully—

Start at the head and neck, then check the spine and trunk, and finally the upper and lower limbs.

Compare the sides of the body—

Should you find something which appears abnormal, see what the other side looks like.

Look at the colour of the skin, the nail beds and conjunctivae.

Listen to the nature of the breathing—

Smell the breath.

Count the pulse, noting its strength and rhythm.

Check the temperature of the body.

In the conscious patient, parts of the body which are free from pain and have normal movement and appearance need not be examined in great detail.

When the patient is unconscious—

a very thorough examination is necessary.

Management

Reassurance of the patient is most important—

Calmness and efficiency on your part will inspire greater confi-

dence than mere words.

Pay attention to his request and any remarks that he may make—remember that the patient may overhear remarks not intended for him.

Give any further treatment required.

Removal of Clothing

It is not necessary to strip the patient for diagnosis or treatment. It is, however, often necessary to expose injuries to diagnose and treat them properly. This should be done with the minimum disturbance to the patient. Do not destroy clothing. Where it has to be cut, do this carefully through the seam if possible.

Method—

Coat :

Raise the patient and slip the coat over his shoulders; then remove from the sound limb first and, if necessary, slit up the seam of the sleeve on the injured side.

Shirt and Vest :

Remove as for the coat; if necessary, slit the shirt down the front.

Trousers:

Pull up or down as required; or, if necessary slit the seam.

Boot or Shoe

Steady the ankle, undo or cut loose the laces and remove carefully.

Socks :

If difficult to remove, insert two fingers between the sock and leg, raise the edge of the sock and cut it between your fingers.

Disposal

After the First Aider has done what is necessary, the patient may be—

Sent to hospital by ambulance.

Handed over to the care of a doctor, a nurse or other responsible person.

Allowed to go home and told to seek medical advice, if necessary.

Do not send home unaccompanied anyone who has been unconscious or is badly shocked.

Label :

Use a label, or other written message, to inform the hospital, doctor, or other medical authority of circumstances of the accident or illness and treatment given.

Be Brief

Use the smallest number of words which will convey your meaning clearly.

Take the name and address of the patient and of the nearest relative or friend.

Having treated and disposed of the patient, check that his relative or friend is being notified by the police or ambulance men as part of the accident service, if not, arrange to do this.

Take care of any personal property of the patient and do anything you can to help in a general way, e.g. by sending a message to the police road patrol in car accident or notifying an employer.

In sending messages by telephone, ask the person receiving the message to repeat it to make sure that it has been understood.

ARRANGEMENT FOR THE RECEPTION OF A CASUALTY IN A HOUSE

1. Select the room: Choose one which is easy of access, on the ground floor if possible. It should be large and airy and provided with a fireplace to ensure efficient ventilation. In private houses the choice is necessarily limited, but one with a cheerful sunny aspect is desirable. The patient's own room is the best if it fulfils these requirements.

2. Clear the passage and staircase of furniture and mats as far as possible.

3. Prepare the bedroom: Light the bedroom fire and remove all unnecessary furniture. Place the bed so that both sides are easy of access.

4. Prepare the bed: A single bedstead with a firm mattress (not a featherbed) should be used. If the patient has sustained

a fracture of the spine pelvis or lower limb place transverse boards under the mattress and have ready a bed-cradle.

Remove the upper bed clothes, place a mackintosh or water-proof in the bed and a draw-sheet on that portion of the bed on which the injured part will lie. Over this place a temporary blanket or sheet, aprons, brown paper or even newspapers to keep the bed clean until the soiled clothing is removed and the patient has been attended to by the doctor.

Place hot water bottles or hot bricks covered with flannel in the bed.

5. Prepare for collapse. Have ready hot blankets, tea, coffee and other stimulants.

6. Have ready for the doctor a small easily movable table, basins large and small, plenty of hot and cold sterilised water, soap, towels, cotton wool, pins, scissors, a pail to receive the dirty things, and any dressings and antiseptics available.

7. Clean clothing for the patient should be airing by the fire, and extra bed clothes and pillows in case they should be needed.

INJURIES LIKELY TO BE MET IN PRODUCING FACTORIES AND INDUSTRIES

In producing factories and industries the types of injuries sustained by workers generally, are as below:—

The victim may be pinned down under the machinery. There may be lacerations; a part of a limb may be avulsed, there may be multiple fractures or severe traumatic shock. In some cases it is not possible to extricate or release the victim. In such cases, the machinery should be stopped immediately, power cut off and services of senior foreman or the person who is familiar with the machine, requisitioned. Modern machines have automatic releasing devices or you may have to dismantle the parts. The first aider is to attend the victim, control the bleeding, treat shock, reassure and cover any burnt or injured part. If this victim is unconscious ensure that the air way is clear. Arrange for immediate medical aid at the spot and remove to the hospital.

In air crash or railway accidents, comprehensive skilled medical facilities are available from the concerned authority.

The instructions issued by them have to be followed.

In case of accidents in deep mines such as coal mines, besides first aid treatment rescue work is very important and is to be urgently provided. This is only possible by special safety devices and trained staff, the facilities for which must be available at all mines and at all times. Any delay or ill equipped services may lead to heavy casualties.

INJURIES AND ILLNESSES LIKELY TO BE MET IN RURAL AREAS

In rural areas there may be the following specific types of injuries.

1. Fall from a tree or fall of a branch of a tree on the victim as people have a habit of sitting or sleeping under the shade of trees in summer at day time.
2. Fall of mud, walls, of the house or roof. The roof of the houses in villages have usually no parapet walls and children may fall from the roof.
3. Caving in of mud while digging.
4. Fall from a horse back or a kick by the horse or a donkey.
5. Fall from the Julah when the rope snaps.
6. Drowning in a village pond or canal water.
7. Railway tract accident.
8. Crushed under a bus, car or a tractor.
9. Snake bite, scorpion bite, jackal bite, camel bite and leeches.
10. Acute gastroenteritis poisoning, cholera.
11. Heat stroke, heat exhaustion and high fever.
12. Frost bite in hilly areas.
13. Dog bite and hydrophobia.
14. Electric shock and electrocution from our head-high tension wire.
15. Cut from sharp agricultural implements.
16. Lathi blow, stone throwing, stab wound, kirpan wound or gun shot wound as a result of fighting between rival groups of persons.
17. Boat disaster.
18. Tetanus infection from wound etc.
19. Burns of various degrees.

20. Carbon Monoxide poisoning by sleeping in a closed room where sigri is kept burning especially at night, when room is kept closed and there is no ventilation.
21. Poisoning with DDT and other insecticides and fertilisers.

Usually medical facilities are not adequate especially in the remote villages and there is difficulty in transportation due to non-availability of proper transport services and provision of roads. A Charpai could be used in the villages in place of stretcher. Most of these problems can be handled at the initial stage by a trained first aider. Regarding transportation of the seriously injured, the victims to be transported, have with the aid of facilities available at present, to hospitals or primary health centres of the area.

HANDLING AND TRANSPORT OF INJURED PERSONS

EXAMINATION

It is important in the early stages of any accident to decide whether the casualty should be treated where the accident occurred or whether by moving him, it would be safer and easier to carry out a complete examination and treatment. If the casualty is seriously injured or if he has multiple injuries it may be better to deal with him where he lies, as much further damage can be caused in removal. A first aider acting alone or with unskilled help, may easily cause more damage trying to move the casualty than by dealing with him at the site of the accident. Anyhow if advice of a doctor is required, victim has to be taken to him as early as possible.

Before moving a casualty, unless life is endangered by fire, falling debris or a poisoned atmosphere it is important, especially if he is unconscious, to carry out a quick but systematic examination of the head and neck, chest and abdomen and all limbs, which if injured, must be supported during the removal.

After the initial removal from danger, or to enable treatment to be carried out more satisfactorily, do not forget to carry out the remainder of the examination. Two of the commonest mistakes made in first aid practice are:—

- to move the casualty without making a proper preliminary examination so that insufficient or incorrect support to injured parts is given during removal; or
- after removal, to forget to complete the examination of the casualty because a preliminary examination was made.

In either case, additional danger may be caused to the casualty because certain injuries may have been missed.

After the appropriate first aid treatment has been given the following principles of transport must be kept in mind:—

1. The position assumed by the casualty or in which he has been placed, must not be disturbed unnecessarily.
2. Throughout the transport a careful watch must be kept on:—

- (a) The general condition of the casualty,
 - (b) Any dressings that may have been applied,
 - (c) Any recurrence of haemorrhage.
3. The transport must be safe, steady and speedy.

REMOVAL

An injured or sick person may be removed to shelter by:—

1. Support of single helper.
2. Handseats and the 'kitchen-chair' carry.
3. Blanket lift.
4. Stretcher.
5. Wheeled transport (ambulance).
6. Air and sea travel.

The method to be adopted, and it may be necessary to use more than one, will depend upon—

- the nature and severity of the injury;
- the number of helpers and facilities available;
- the distance to shelter;
- the nature of the route to be covered.

Method of Carrying

A. If only one bearer is available.

1. Cradle.
2. Human crutch.
3. Pick-a-Back.
4. Fire Man's lift & carry.

1. *Cradle*. (To be used only in the case of light casualties or children).

Lift the casualty by passing one of your arms well beneath his two knees and the other round his back.

2. *Human Crutch* ; Standing at his injured side, where there is injury to an upper limb, assist the casualty by putting your arm round his waist, grasping the clothing at his hip and placing his arm round your neck, holding his hand with your free hand (Fig. 74)

If his upper limbs are injured and his other hand is free,



Fig. 73

Fig. 74





Fig. 75

the casualty may gain additional help from a staff or walking stick.

3. *Pick-a-back* : If the casualty is conscious and able to hold on, he may be carried in the ordinary 'Pick-a-back' fashion. (Fig.75.)

4. *Fireman's lift and Carry* : (To be used only when the casualty is not too heavy for the bearer). Help the casualty to rise to the upright position. Grasp his right wrist with your left hand. Bend down with your head under his extended right arm so that your right shoulder is level with the lower part of his abdomen and place your right arm between or round his legs.

Taking his weight on your right shoulder rise to the erect position. Pull the casualty across both shoulders and transfer his right wrist to your right hand, so leaving your left hand free (Fig.76).

B. If two or more bearers are available :—



Fig. 76

HAND SEATS

The four-handed seat. This seat is used when the casualty can assist the bearer by using one or both arms.

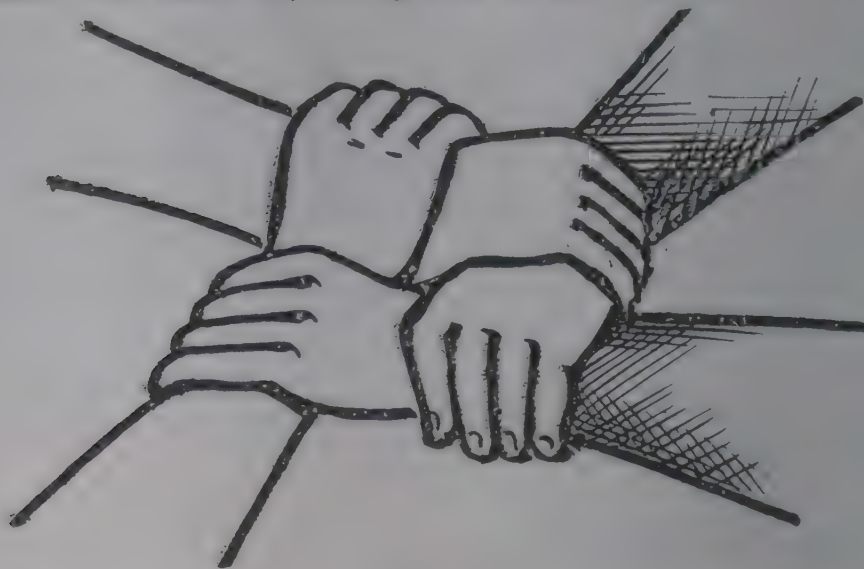


Fig. 77

1. Two bearers face each other behind the casualty and grasp their left wrists with their right hands and each other's right wrists with their left hands (Fig. 77) .

2. The casualty is instructed to place one arm round the neck of each bearer so that he may raise himself to sit on their hands and steady himself during transport.

3. The bearers rise together and step off. the bearer on the right hand side of the casualty with the right foot and the left hand bearer with the left foot (Fig. 78)



Fig. 78

The two-handed seat ; This seat is mostly used to carry a casualty who is unable to assist the bearers by using his arms.

1. Two bearers face each other and stoop—(not kneel)—one on each side of the casualty. Each bearer passes his forearm nearest to the casualty's head under his back just below



Fig. 79

the shoulders, and if possible, takes hold of his clothing (Fig. 79). They slightly raise the casualty's back and then pass their other forearms under the middle of his thighs and clasp their hands; the bearer on the left of the casualty with his palm upwards and holding a folded handkerchief to prevent hurting



Fig. 80



Fig. 81

by the finger nails ; the bearer on the right of the casualty with his palm downwards, as shown in Fig. 80 (Hook-Grip).

2. The bearers rise together and step off, the right-hand bearer with the right foot and the left-hand bearer with the left foot (Fig. 81)

In all cases of carrying by Hand Seats the bearers walk with the cross-over step and not by side paces.

The Fore and AFT Method : This method of carrying should be used only when space does not permit of a hand seat. One bearer stands between the casualty's legs, facing the feet. bends down and grasps the casualty under his knees. The other bearer takes a position behind the casualty and after raising his trunk passes his hands under the casualty's armpits and grasps

his own wrists on the casualty's chest, The casualty is then lifted (Fig. 82). The bearers walk in step.



Fig' 82

3. The 'kitchen-chair' carry (Fig. 83). The bearers walk instep by carrying the patient in a chair.



Fig. 83

Blanket Lift ; The placing of a casualty on to a blanket is described on page , (Fig. 84).

When lifting by a blanket, the edges are rolled up close to the casualty's sides and lifted as shown in Fig.



Fig. 84

C. STRETCHERS.

Stretchers are of two patterns, viz. "Ordinary" (Figs. 85 & 86) and 'Telescopic-handled'. In general Principle they are alike, the component parts being designated the poles, handles, jointed traverses runners, bed, pillow-sack and slings. The 'head' and 'Foot' of a stretcher correspond to the head and feet of the casualty.

At the head of the stretcher there may be a canvas overlay (the pillow-sack), which can be filled with straw, hay, clothing etc. to form a pillow. The pillow-sack opens at the head and its contents can therefore be adjusted without due disturbance of the casualty. The traverses are provided with joints for opening or closing the stretcher. The telescopic-handled pattern is similar but its length can be reduced to 6 feet by sliding the

handles underneath the poles. This is of a great value when working in confined spaces, or when a casualty has to be taken up or down a narrow stair-case with sharp turns.

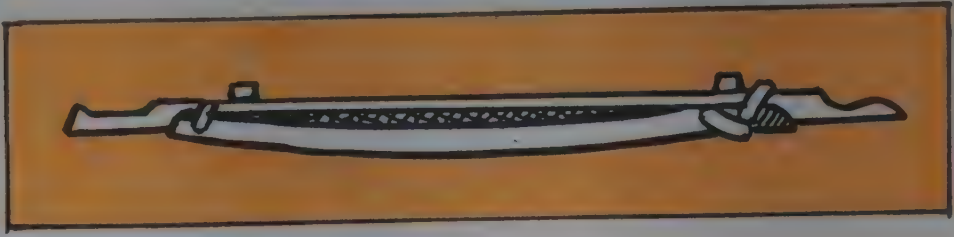


Fig. 85



Fig. 86

When closed, the poles of the stretcher lie close together, the traverse bars being bent inwards, the canvas bed neatly folded on the top of the poles and held in position by the slings, which are laid along with canvas and secured by a strap which is placed transversely at the end of each sling and passed through the large loop of the other, and round the poles and bed.

CARRYING SHEETS : are made of canvas and have eyelet holes at intervals, to which rope handles are attached. These are also useful in similar circumstances.

STRETCHER EXERCISE FOR FOUR BEARERS

1. Selection and Numbering of Bearers

Four bearers will be selected and numbered 1,2,3,4 from tallest to shortest in order to give as even a carry as possible. They will take up the position shown in Fig. 87).

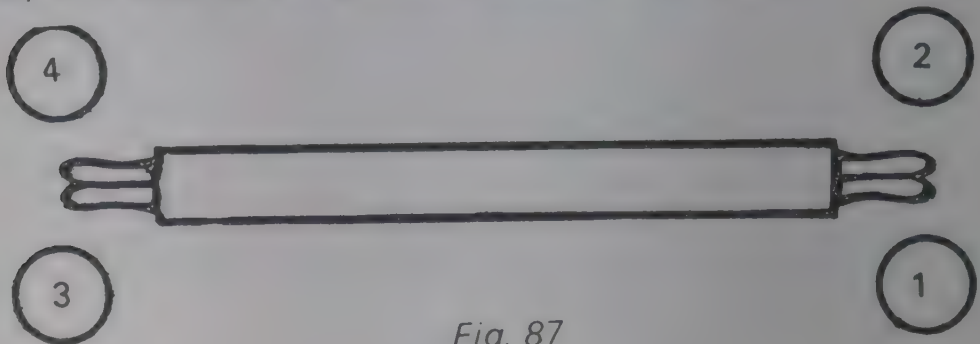


Fig. 87

No. 1 bearer is the leader of the squad and is responsible for the welfare of the casualty until he is seen by a Doctor or handed over to another responsible person. All stretcher-bearers must be able to undertake the duties of No. 1 bearer.

2. Collection of Blankets and Stretcher

No. 1 will give the command, No. 3 collect Blankets, No. 4 collect stretcher "right turn-quick March". The named bearers will collect the blankets and stretcher. No. 3 will fold the blankets neatly and carry them over his right arm and No. 4 will carry the stretcher at the slope on the right shoulder runners to the front. On their return No. 3 will resume his position behind No. 1 and No. 4 will slide the stretcher foot first between Nos. 1 and 2, runners to the right, and resume his position behind No. 2.

3. Lifting Stretcher

On the command "Lift Stretcher", No. 2 and 4 stoop together, grasp the handles of the stretcher with their right hands, knuckles to the right, and rise together.

4. Collecting Casualties:

On the command "At the Double-Collect casualty", the squad will double to the casualty and halt when the leading bearers are a short distance from his head. Nos 2 and 4 will lower the stretcher and place it on the ground in line with the

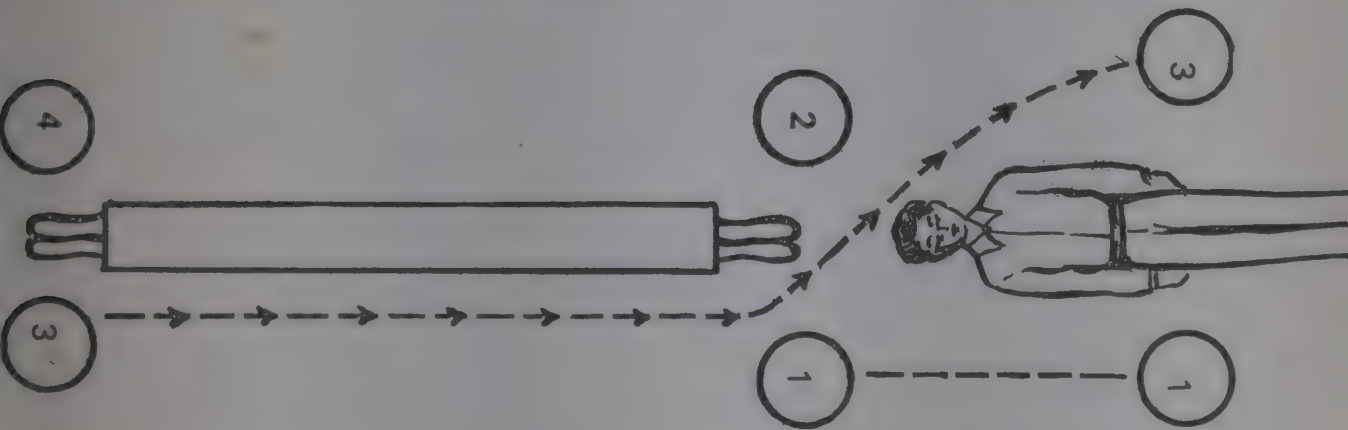


Fig. 88

casualty (Fig. 88). No. 1 will then double out to the right of the casualty and prepare him for removal. He may instruct No. 3 to assist him.

5. Preparing and Blanketing Stretcher

On the command "Prepare and Blanket Stretcher". Nos. 2 and 4 will open the stretcher, see that the transverse bars are secure, test it and blanket it by one of the methods shown below according to the number of blankets available.

Where one blanket only is available, proceed as in Fig. 89.

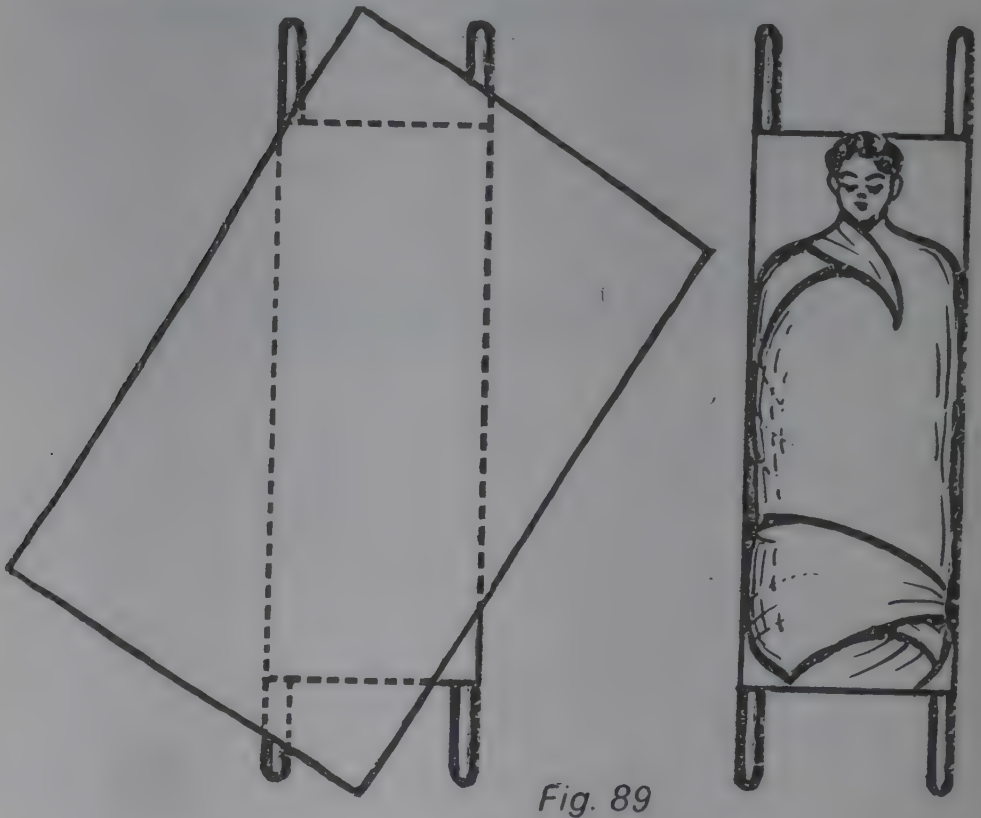


Fig. 89

Blanketing Stretcher with Two Blankets

1. Place the first blanket lengthwise across the stretcher with one edge covering half the handles at the head end, and slightly more to one side of the stretcher than the other (Fig. 90). 1st stage)

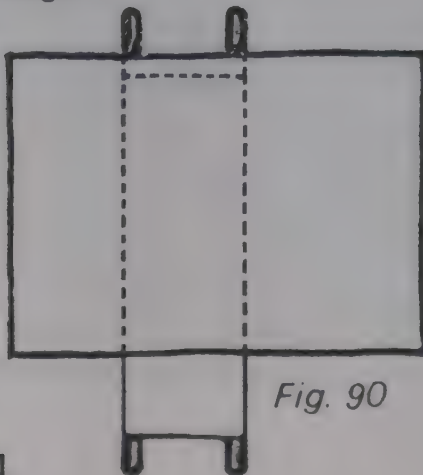


Fig. 90

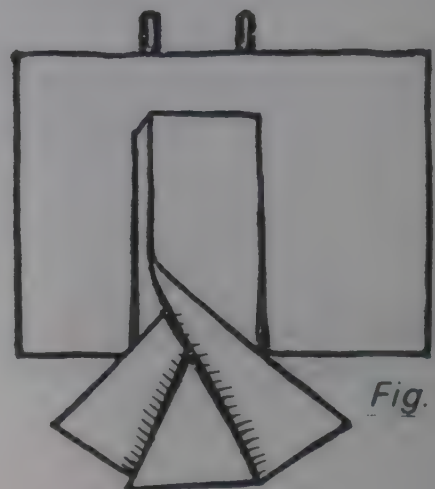


Fig. 91

2. Fold the second blanket lengthwise in three and lay it on the stretcher with the upper edge about fifteen inches below the upper edge of first blanket.

3. Open out the folds of the second blanket at the lower end for about two feet (Fig. 91, 2nd stage).

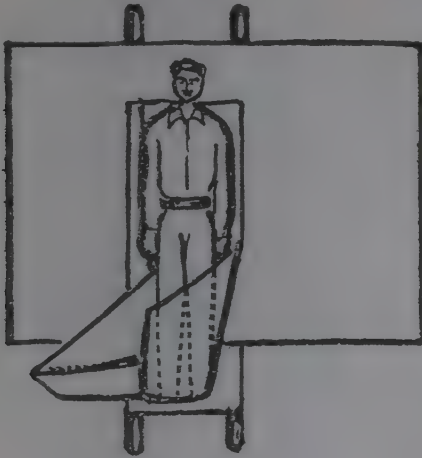


Fig. 92



Fig. 93

Wrapping the Casualty:

Place the casualty on the four thicknesses of blanket on the stretcher and:—

1. Bring the foot of the second blanket up over the feet, tucking in a small fold between the feet.

2. Bring the sides of the folds of this blanket over the feet and lower part of the leg and tuck in (Fig. 92, 3rd stage).

3. Turn in the upper corners of the first blanket and bring the shorter end over the casualty, then bring the longer end over and tuck in well (Fig. 93, 4th stage).

If a third blanket is available, it should be doubled lengthwise, and laid over the casualty before he is tucked in.

6. Loading Stretcher:

(a) When the casualty is lying on a blanket or rug.

The edges of the blanket or rug must be firmly rolled close up to the casualty. On the command "Load Stretcher", the bearers, two on either side, will grasp the rolls and, unless a fifth bearer is available to slide the stretcher underneath the casualty, will move by side paces over the stretcher and lower the casualty carefully on to it. This is known as the blanket lift, (Fig.94).



Fig. 94

(b) When the casualty is not lying on a blanket or rug and a spare one is available,

The casualty must be placed on a blanket or rug as follows :—

Place the blanket or rug on the ground alongside the casualty and roll it lengthwise for half its width. No. 2, 3, and 4 will turn the casualty carefully on to his uninjured side (see Fig. 95), No. 1 will place the rolled portion of the blanket or



Fig. 95

rug close to the casualty's back and all the bearers will gently roll the casualty over until he is lying on his opposite side on the blanket or rug. The blanket or rug will then be unrolled and the casualty gently turned on his back so that he lies in the centre of the open blanket or rug. On command "Load Stretcher" proceed as at 6(a).

Provided four or more bearers are available, the blanket lift or rug lift is the best method for loading a casualty on to a stretcher owing to the smoothness of the whole operation.

(c) When the casualty is not lying on a blanket or rug and none is available,

On the command "Load Stretcher", Nos. 4,3 and 2 will place themselves on the left of the casualty; No. 4 facing the shoulders, No. 3 facing the hips and No. 2 facing the knees; No. 1 will place himself on the right of the casualty facing No. 3 (Fig. 96). All will go down on their left knees and place their forearms beneath the casualty, paying particular attention to the site of the injury.

(Position of Bearers)

Loading stretcher when no blanket is available.

(1st and 2nd Movements)

Using the hook grip (Fig. 97), No. 1 joins his left hand with



Fig. 96



Fig. 97

the left hand of No. 4 and right hand with the right hand of No. 3 and 4 supports the head and shoulders, No. 2 the lower limbs (Fig. 97).

When No. 1 gives the order "Lift" the casualty is lifted gently and slowly and placed on the knees of Nos. 4,3 and 2 (Fig. 98). No. 1 will disengage, take hold of the stretcher (left hand across, resting the near pole on his left hip) and place



Fig. 98



Fig. 99

the stretcher under the casualty, so that when he is lowered on to it, his head will just be clear of the metal bar at the top and will rest on the pillow if one is available (Fig. 99). No. 1 will then resume the position.

When No. 1 gives the order "Lower", the casualty will be raised slightly from the knees of Nos. 4, 3 & 2, lowered gently and carefully on the stretcher and covered with coats. The bearers then rise and turn to face the foot of the stretcher.

If it is necessary to lift the casualty from the right side, bearers will go down on their right knees.

7. Standing to Stretcher

On the command : "Stand to—Stretcher", No. 1 will take up a position level with the handles at the foot of the stretcher; No. 2 will step forward opposite No. 1; and No. 3 will double round the head of the stretcher opposite No. 4. When standing to stretcher the positions of Nos. 1 and 3 bearers will be on the right and those of Nos. 2 & 4 on the left of the stretcher,

8. Carrying a Loaded Stretcher

No. 1 will decide whether the stretcher is to be carried by four or two bearers,

(a). *Hand Carriage by Four Bearers:*

On the command; "Hand Carriage by four bearers—Lift—Stretcher", all four bearers stoop together, grasp the poles with their inner hands rise together holding the stretcher at the full extent of their arm. (Fig. 100)

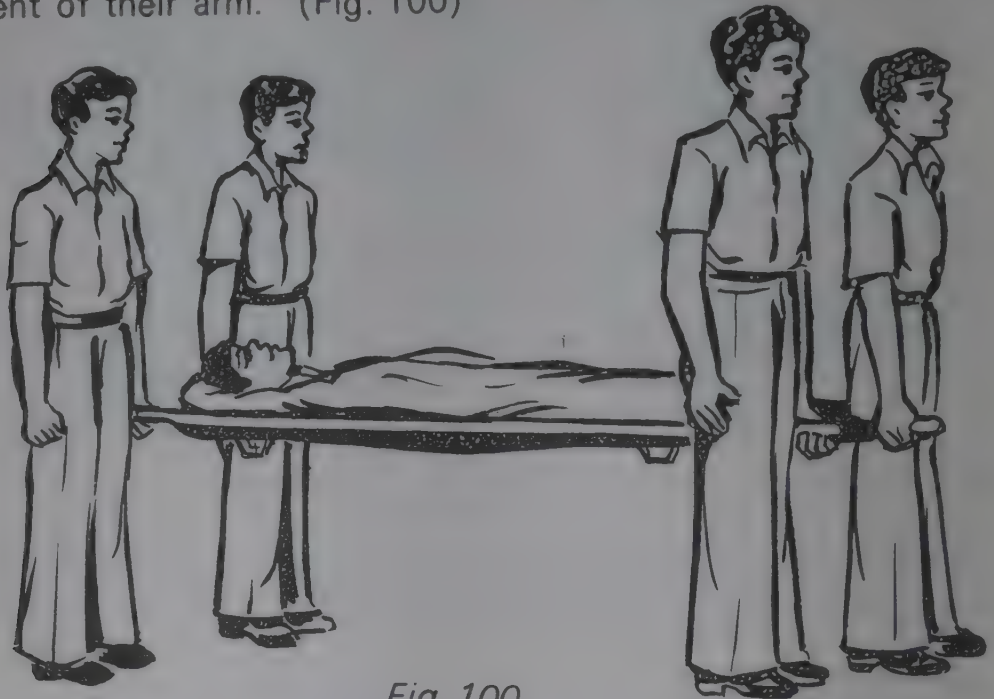


Fig. 100

ADVANCING

On the command: "Advance" all bearers will step off with the inner foot. The bearers must keep their knees slightly bent and walk with a relaxed gait.

RETIRING

On the command: "Retire" the squad will retire by wheeling and not by turning.

LOWERING A LOADED STRETCHER

On the command: "Lower Stretcher", the four bearers will stoop, gently lower the stretcher to the ground and rise together.

(b) *Hand Carriage by Two Bearers:*

On the command: "Hand Carriage by Two Bearers—Lift Stretcher", Nos. 2 and 4 will take a side pace over the handles of the stretcher and if they decide to use slings will pick them up, place them over their shoulders and on the handles of the stretcher. They will then rise steadily together keeping the

stretcher level, Nos. 1 and 3 will turn inwards to assist. No. 1 particularly can help to prevent the casualty's feet catching on the buttocks of No. 2. Nos. 1 and 3 will then turn to face the foot of the stretcher (Fig. 101)

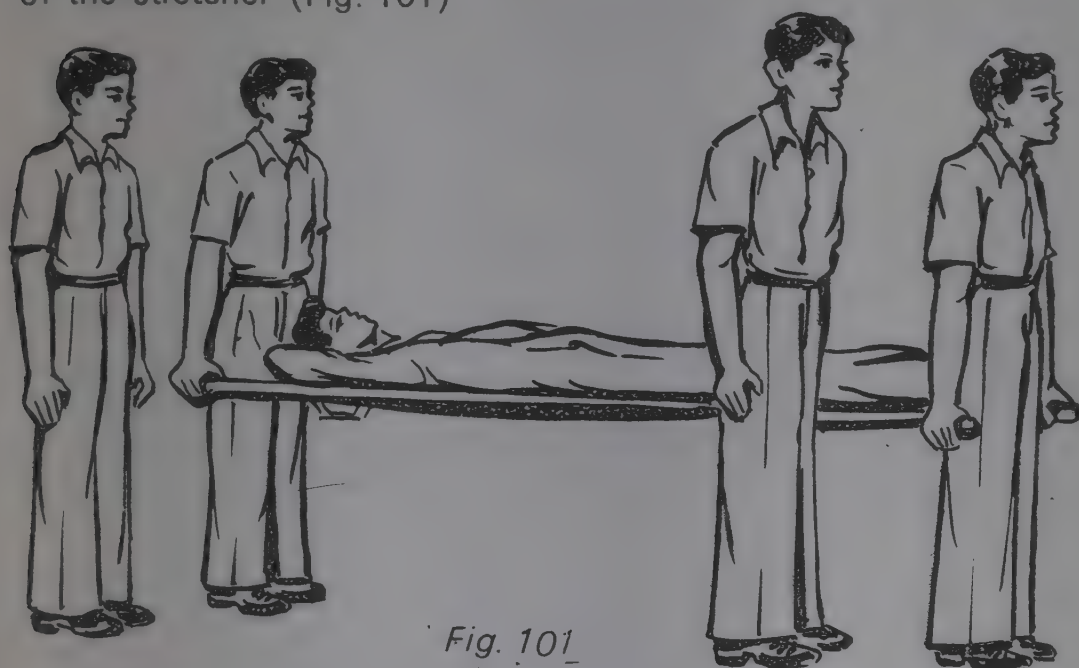


Fig. 101

Adjusting slings (If used)

On the command : "Adjust Slings", Nos. 1 and 3 turn to the left and adjust the slings of No. 2 and 4 respectively.

ADVANCING

On the command : "Advance", Nos 1, 2 & 3 will step off with the left foot and No. 4 with the right. The bearers must keep their knees slightly bent and walk with a relaxed gait.

RETIRING

On the command : "Retire", the squad will retire by wheeling and not by turning.

LOWERING A LOADED STRETCHER

On the command : "Lower Stretcher", Nos. 2 and 4 stoop slowly, gently lower the stretcher to the ground and rise together. If slings are in use Nos. 2 and 4 will remove them after lowering the stretcher, step over the handles to their former positions, and place the loops of the folded slings over the near handles and the ends over the other handles.

9. Relieving Bearers by Changing Numbers

On the command : "Change Numbers", Nos. 1 and 3 will turn about and the whole team will then step off together. Nos.

3 & 2 wheeling round the ends of the stretcher and all moving round two places clockwise. Each bearer will halt in the position of the bearer whose place he has taken and the new Nos. 1 and 3 turn left about so that all again face the foot of stretcher (Fig. 102)

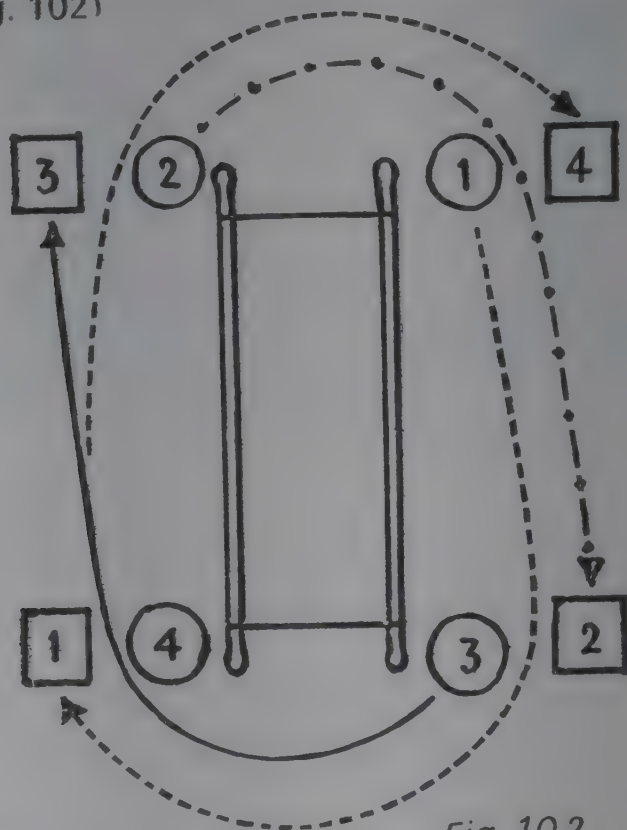


Fig. 102

10. Unloading the Stretcher

On the command : "Unload Stretcher" the bearers will adopt a similar procedure to that carried out for loading the stretcher. If the casualty is lying on a blanket, the blanket lift should be used ; reversing the procedure (described on page). Where there is no blanket ; after the casualty has been lifted to the bearers knees, No. 1 will lift the stretcher and carry it three paces beyond the casualty's feet and when the casualty has been lowered to the ground, bearers will march and take up their normal position on the open stretcher. (Fig. 88, page 153).

11. Closing a Stretchers

On the Command: "Close Stretcher", Nos. 2 and 4, turn inward and close the stretcher by pushing in the poles after traverse bars have been unlocked, folding the canvas on itself and buckling the straps tightly round the stretcher behind the traverse bars.

12. Returning Blankets and Stretcher

At the end of the exercise No. 1 will give the command: No. 3 "Return Blanket", No. 4 "Return stretcher". Nos. 3 and 4 right turn-quick March. The procedure to be followed by Nos. 3 and 4 is similar to that carried out for collecting blankets and stretcher.

FOR THREE BEARERS

The stretcher will be placed at the casualty's head, in line with his body. No. 1 kneels on the left knee on the injured side opposite the casualty's knees and passes his hands under the casualty's legs, No. 2 and 3 kneels on their left knees on opposite sides of the casualty facing each other and passing their hands under his shoulder and hip, lock their finger by the hook-grip (Fig. 103).

On the command: "Lift" the bearers will rise to the erect position and, moving by side paces, carry the casualty head foremost over the foot of the stretcher, the horizontal position of his body being maintained throughout the movement, and lower him carefully on the stretcher

When unloading, the casualty will be lifted and carried head foremost over the head of the stretcher.



Fig. 103



Fig. 104

FOR TWO BEARERS

(for use in mines and narrow cuttings where space is limited)

LIFTING THE CASUALTY

Both bearers will stand astride the casualty, No. 2 at the head, placing his forearms under the casualty's shoulders; No. 1 about the knees placing his left hand beneath the casualty's thighs and his right below the knees. When both are ready, No. 1 will give the command "Lift".



Fig. 105

ADVANCING

No. 1 will give the order "Advance", and both will step off together with the left foot, taking short even paces and stooping so that the body of the casualty is not far from the ground (Fig. 105). They will advance till the casualty is over the stretcher when No. 1 gives the order: "HALT-LOWER"



Fig. 106.

LOWERING THE CASUALTY

On the command: "Halt-Lower", the casualty is lowered gently on the stretcher (Fig. 106). Both bearers then take up position on the left of the stretcher ready for lifting, No. 2 at the head and No. 1 at the foot.

An alternative method is to roll the casualty on to his side. Place the blanketed stretcher with the bed close up to the casualty's back. The two bearers standing behind the stretcher lean over and grasping him firmly turn the casualty and stretcher together into the normal position.

Stretcher may be improvised as follows:—

1. Turn the sleeves of two or three coats inside out; pass two strong poles through them, button the coats. The poles may be kept apart by strips of wood lashed to the poles at both ends of bed formed by the coats.
2. Make holes in the bottom corners of one or two sacks and pass stout poles through them keeping them apart.
3. Tie broad bandages at intervals to two poles.
4. Spread out a rug, piece of sacking, tarpaulin or a strong blanket, and roll two stout poles up in the sides. Two bearers stand on each side and grasp the middle of the covered pole with one hand, and near the end with the

other. They walk sideways using the cross over step.

5. A hurdle, broad piece of wood, door or shutter may be used, clothing, hay or straw should be placed on it and covered with a piece of stout cloth or sacking which is useful for taking the casualty off the stretcher.

Always test an improvised stretcher before use.

RULES FOR CARRYING CASUALTIES ON STRETCHERS

As a general rule, carry a casualty feet first. The exceptions are:—

- a) When carrying a stretcher upstairs.
- b) When going uphill with a casualty whose lower limbs are Uninjured.
- c) When going downhill with a casualty whose lower limbs are injured.
- d) When carrying a casualty to the side or foot of a bed.
- e) When loading an ambulance.

TO CROSS AN UNEVEN GROUND

If possible the stretcher should be carried by four bearers and kept as nearly level as possible. This can be done and the casualty prevented from falling off by each bearer independently adjusting the height of the stretcher as necessary. Over very uneven ground for short distances the four bearers should face inwards.

TO CROSS A DITCH

The stretcher is lowered with its foot one pace from the edge of the ditch. Nos. 1 and 2 bearers then descend. The stretcher is now advanced, Nos. 1 and 2 in the ditch supporting the front and while the other end rests on the edge of the ground above. Nos. 3 & 4 then descend. All the bearers now carry the stretcher to the opposite side and the foot of the stretcher is made to rest on the edge of the ground, while the head is supported by Nos. 3 and 4 in the ditch. Nos. 1 and 2 climb out. The stretcher is lifted forward on the ground above, and rests there while Nos. 3 and 4 climb up.

TO CROSS A WALL

The stretcher is lowered with the foot about one pace from the wall, the bearers then stand to stretcher, Nos. 2 and 4 on the left, Nos. 1 and 3 on the right. They turn inwards, stoop



Fig. 107

down, grasp the poles with both hands and rise slowly lifting the stretcher, holding it level at the full extent of the arms. Then by side paces they advance to the wall, raise the stretcher and lift it on to the wall, so that the front runners are just over the wall. No. 2 then crosses the wall and takes hold of the front handles; No. 1 then crosses the wall; they grasp the poles, lift the foot of the stretcher; all the bearers then advance and rest the rear end of the stretcher, on the wall. The rear runners should be kept on the near side of the wall, otherwise the handles may slip. No. 4 then crosses the wall and takes hold of the left pole. No. 3 then crosses the wall and takes hold of the right pole. The bearers then advance until the stretcher is clear of the wall. The stretcher is then lowered to the ground.

TO LOAD AN AMBULANCE

The stretcher is lowered with its head one pace from the doors of the ambulance. The casualty will be loaded head first.

The bearers now stand to the stretcher.

On the Command: "*Load*" the bearers turn inwards, stoop, grasp the poles of the stretcher, hands wide apart, palms uppermost; they rise slowly, lifting the stretcher, holding it level at the full extent of the arms. They then take a side pace to the ambulance raising the stretcher evenly to the level of the berth to be loaded. The front bearers place the runners in the grooves and then assist the rear bearers to slide the stretcher into its place and secure it. If slings have been used they should be kept with their stretcher.

Many ambulances are provided with upper and lower berths. In such cases the sequence of loading is upper right, upper left, lower right, lower left.

It should be noted that this method might not be practicable if the ambulance to be loaded is of the single rear door type. In such circumstances the following method of loading should be adopted.

On the command "*Load*" No. 4 will take up position inside the ambulance facing the stretcher and No. 2 will take up position opposite No. 3 with No. 1 between the handles facing the ambulance. Nos. 2 and 3 turn inwards and all three bearers lift the stretcher to the required height, move forward and hand the head of the stretcher to No. 4. No. 2 and 3 then move backwards to assist No. 1 who will load the appropriate berth with No. 4.

TO UNLOAD AN AMBULANCE

Two bearers take hold of the handles at the rear and gently withdraw the stretcher. As it is withdrawn, the other two will take hold of the handles at the front, and taking the weight, lower it to the full extent of the arms; then by side paces march clear of the ambulance, lower the stretcher to the ground.

To unload an ambulance with a single door Nos. 4 and 1 will enter the ambulance with Nos. 2 and 3 on either side of the door to assist No. 1 to descend. The stretcher is then withdrawn from the ambulance and Nos. 2 and 3 receive the head of the stretcher from No. 4. The stretcher is then carried clear of the ambulance and lowered to the ground.

LIFTING INTO BED

The stretcher is lowered at the side of the bed. The bearers take positions as for unloading stretcher, Nos. 2, 3 and 4 being on the side farther from the bed. The casualty is unloaded on the knee of Nos. 2, 3 and 4. No. 1 will disengage and remove the stretcher (this may be done by pushing it under the bed). He then joins hands with No. 3. All the bearers rise to a standing position, supporting the casualty on their forearms. No. 1 disengages and goes to the patient's head, and supports it. All bearers then step forward and gently place the casualty on the bed. If the bed is narrow and there is room, the stretcher may be placed on the floor with the head close to the foot of the bed. The casualty may then be lifted over the foot and placed on the bed.

If the casualty is lying on a blanket and if the bed is narrow and there is room, the blanket lift should be used, the bearers lifting him over the foot of the bed.

TO TRANSPORT A CASE OF SPINAL INJURY

Prepare the stretcher. The soft bed of the canvas type of stretcher must be stiffened, preferably by placing short boards across the stretcher, or long ones lengthwise on the canvas, if only these are available. If no stretcher is available, a narrow shutter, door or board of at least the same width and length as the patient may be used.

2. Cover the stretcher with a folded blanket and then "blanket the stretcher" by one of the methods shown on pages 154 and 155 (Figs. 89-92).

3. Place pillows or pads in readiness on the stretcher in a position to support the neck, and small part of the back. These should be sufficiently large, but not too large, to preserve the normal curves of the spine.

4. Whenever the casualty is to be moved or lifted he must not be bent, twisted or over extended. One bearer must apply firm but gentle support to the head and face, so as to prevent neck movements and another bearer must steady and support the lower limbs to prevent trunk movements. This must be continued until the casualty has been placed on the stretcher.

5. When the casualty is not already lying on a blanket or rug, and one is available, he must be placed on it as follows:

- (i) Place the blanket or rug on the ground in line with the casualty, and rolled lengthwise for half its width.
- (ii) While the two bearers maintain control of the head and lower limbs, other bearers very carefully turn the casualty on to his side every, precaution being taken against movement at the site of the fracture. Place the rolled portion of the blanket or rug close to the casualty's back and gently roll him over the roll until he is lying on his opposite side (Fig. 60). Unroll the rolled portion of the blanket or rug and gently lower the casualty on to his back so that he lies in the centre of the open blanket or rug. The bearers at the head and lower limbs conform to the rolling of the casualty throughout.

6. *Loading the stretcher*

There are two methods of loading a stretcher, a Standard Method (when there is a blanket under the casualty) and an Emergency Method (when there is no blanket under the casualty and none is available). In cases in which the stretcher can be pushed under the casualty it will be necessary for the bearer at the feet to keep his legs wide apart to allow the stretcher to be placed between them.

- (a) Blanket Lift — Standard Method for loading fractures of the spine when there is a blanket under the casualty:
 - (i) Roll the two edges of the blanket up against the casualty's side. If poles of sufficient length and rigidity are available the edges of the blanket should be rolled round them. This will make the lifting of the casualty very much easier.
 - (ii) While two bearers maintain support of the head and lower limbs, the remaining bearers distribute themselves as required on each side of the casualty facing one another. On the word of command they raise him by grasping the rolled edges of the blanket and, acting together, carefully and evenly lift him to a sufficient height to enable the stretcher to be pushed underneath him. If this is for any reason impossible the stretcher should be brought as near to the casualty as circumstances permit and the bearers should move

with short even side paces until the casualty is directly over the stretcher, when he should be gently and cautiously lowered (see also page 88).

(iii) Ensure that the pads are in the correct position,

(b) Emergency Method for loading fractures of the spine when there is no blanket under the casualty and none is available—

(i) Open out the casualty's jacket and roll it firmly so that the rolls are close to each side.

(ii) Place the casualty on the stretcher adopting the same procedure as described for the Standard Method except that the bearers grasp the rolled-up jacket and/or the clothing and/or bandage round the casualty's thighs instead of the rolled edges of the blanket. When the clothing is insecure, a broad bandage must be placed round the body just below the shoulder for the bearers to grasp.

7. In the case of cervical injuries, place firm supports such as rolled-up blankets or sandbags on each side of the head to steady it.

8. Place a folded blanket in the hollow above the heels so as to relieve pressure on them.

9. Wrap the casualty as in Figs.

10. If he is to be carried over rough ground, reduce his body movements to a minimum by binding him firmly, but not too tightly, to the stretcher, with broad bandages. These should be applied round the pelvis, thighs and calves, and round the body and arms, just above the elbows.

11. On reaching shelter, do nothing further until the arrival of medical aid.

The above method of transportation of spinal injury case is to be used only if hard board is not available.

RESCUE OF UNCONSCIOUS VICTIMS

If from an elevation after giving emergency first aid, the victim is to be placed on a large hard board or inverted 'charpoy'. Secure him on the board and strap him.

The head of the victim is to be secured tightly and try to rescue him in horizontal position as in (Figs. 108 & 109). If due to certain conditions it is not possible to rescue in

horizontal position, the vertical position is to be used as in Fig.

In case of removal from a 'cave in' accident the first aider must ensure his own safety as more mud or earth or building material may give way. Immediately after the casualty is spotted out you must uncover his face and chest and start artificial respiration if it is necessary. If you have portable oxygen apparatus with you, give oxygen at the spot and then place him on hard board ensuring that he is properly strapped before lifting.

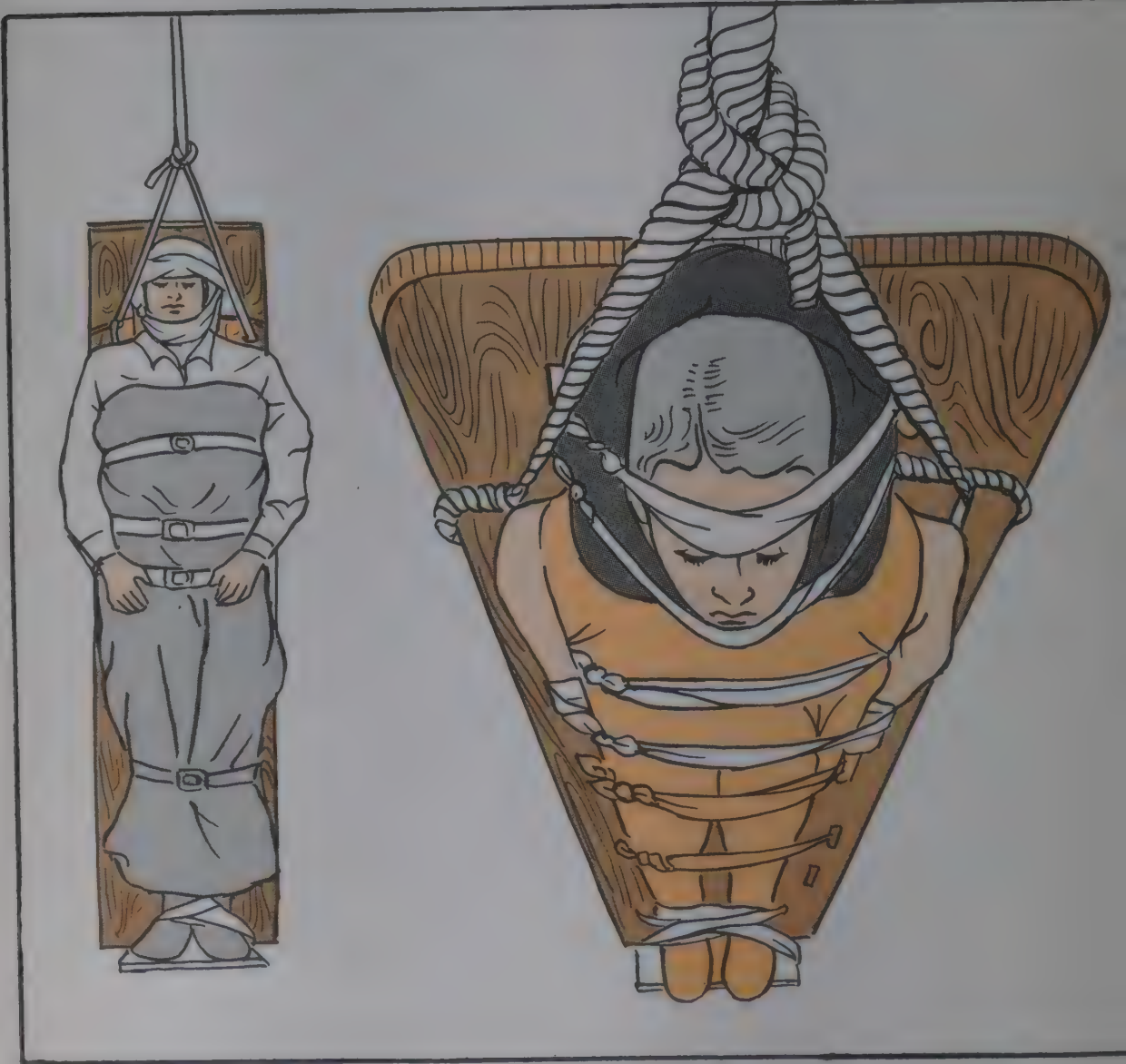


Fig. 108

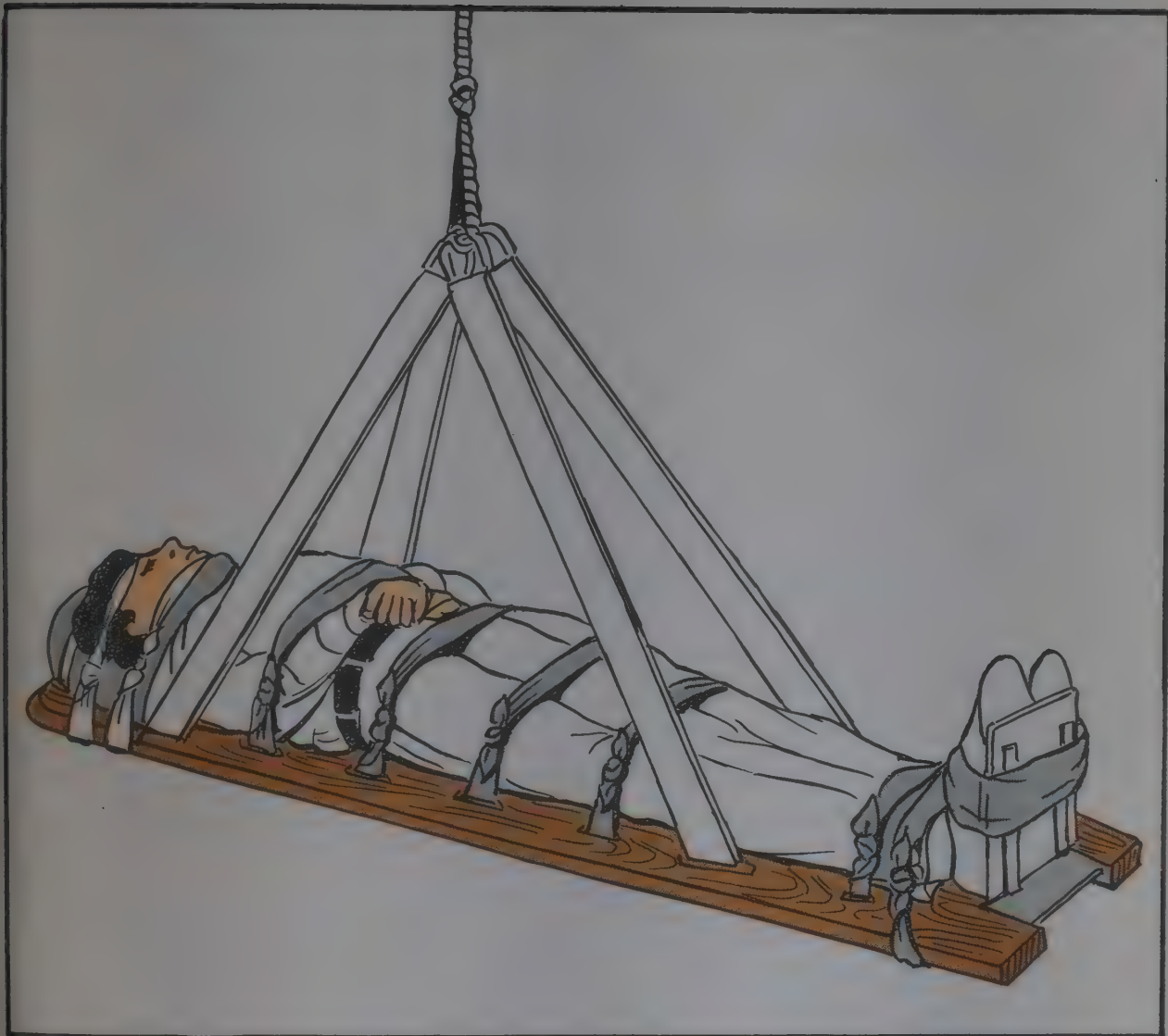


Fig. 109

EXTRACTION OF PERSONS FROM A VEHICLE OVER WHICH AN ELECTRIC LIVE WIRE HAS FALLEN

Instruct the occupant to remain calm and to remain inside the vehicle till professional rescue party arrives. If emergency rescue is required the following procedures are to be adopted :—

The occupant is to be told to open the door as wide as possible and be careful that it does not touch the ground. The first aider should not touch any part of the vehicle. Instruct the passenger to come near the door, keep his feet inside the vehicle, and move to the edge of the seat. Instruct him to fold his arm across the chest and to bring out his head outside the vehicle and be ready to jump. He should then jump with

both feet with one jerk and as far away from the vehicle as possible. Once he is out ask him to get up quickly and walk away. Repeat the process with each passenger in turn. If sign of shock and neurosis is present reassure them.

15

BLOOD TRANSFUSION

There are 4 major blood groups — A, B, O & AB and these groups are either Rh + ve or Rh Negative. Only blood of the same group is compatible for transfusion and even then the blood of donor and recipient of same group has to be directly cross matched before transfusion. The blood group of family members is usually the same.

All youngmen in good health can donate blood every 3-4 months. Only 250-300 c.c. is taken out of a total of 5000 to 6000 c.c. in the body. The doctor examines you before taking your blood. People who have had jaundice should not donate blood for transfusion as there is danger of the recipient developing jaundice.

Unless it is a dire emergency, the husband's blood should not be transfused to his wife; specially if she is of child bearing age as reaction may occur in subsequent pregnancies.

When and how to give transfusion is not in the scope of First Aid.

LABELLING OF CASUALTIES

Symbol on
label and/or
forehead

Interpretation

X	Requires priority of removal from the incident and of examination when reaching hospital. This is used mainly, but not exclusively, for wounds of the chest and abdomen for internal haemorrhage, and for all unconscious casualties.
T	A tourniquet (constrictive bandage) has been applied. The time of application of the tourniquet and subsequent releases should also be indicated on the label.
H	Severe haemorrhage has occurred.
M	Morphine has been given. The time of administration and dose should be written on the label.
C	Contaminated or suspected of having been contaminated by Persistent Gas.
XX	Poisoned by Nerve Gas or Non-Persistent Gases or suspected of having been so poisoned.
P	Burnt by Phosphorus.
R	Radioactivity.

EQUIPMENT — CONTENTS OF A FIRST AID BOX

Large First Aid Box (Dust-Proof)

(17½" X 10" X 6½")

Suitable for Factories etc.

CONTENTS

1. First Aid Leaflet	1 Copy
2. Sterilised Finger Dressings	18 Nos.
3. Sterilised Hand or Foot Dressings	24 "
4. Sterilised Body or Large Dressings	20 "
5. Sterilised Burn Dressings Small	6 "
Large ..	4 "
Extra Large ..	2 "
6. Sterilised Cotton Wool (25 gms)	6 Pkts.
7. Cetavolon (28 gms)	2 Tubes
8. Eye Pad ..	6 Nos.
9. Adhesive Plaster (2.5 cms x 5 M)	1 Spool
10. Assorted Roller Bandage	
2.5 cms x 5.5 M ..	6 Nos.
5 cms x 5.5 M ..	6 "
7.5 cms x 5.5 M ..	6 "
11. Triangular Bandages	12 Nos.
12. Safety Pins (10 Nos.)	1 Pkt.
13. Scissors ordinary, 12.7 cms	
Both sides sharp	One Pair
14. Savlon Liquid Antiseptic 112 ML	1 No.
15. Cotton Wool for padding 50 gms.	2 Pkts.
16. Eye Ointment of Sulphacetamide Preparation (Patent Drug)	1 Btl.
17. Loose Wooven Gauze (28"x 8") in a com- pressed pack	1 Pkt.
18. Aspirin (300 mg) 24 tabs.	1 Btl.
19. Tear off Scribbling Pad (4" x 6") with a pencil in Plastic Cover	1 No.

20. Adhesive Dressing Strips	10 Nos.
21. Field Dressings of Modified Army Pattern	3 Nos.
22. Record Card in Plastic Cover	1 No.
23. Torch Medium Size (4536 of Eveready) without cells	1 No.

Medium First Aid Box (Dust Proof)

(16" x 7 $\frac{3}{4}$ " x 4")

Suitable for Small Institution, Motor Vehicles etc.

CONTENTS

1. One Set First Aid Splints Wooden (Ordinary).
2. 12 Triangular Bandages.
3. 3 Pkts. Sterilised Cotton Wool (25 gms).
4. 6 First Aid Dressings (3 large and 3 medium).
5. 9 Roller Bandages Assorted.
6. 3 Burn Dressings Assorted.
7. 2 Eye Pads.
8. 1 Pkt. of Safety Pins (10 Nos.).
9. One Scissors ordinary 12.7 cm (both sides sharp)
10. 1 Spool Adhesive Plaster.
11. 1 Tube Cetavalon (28 gms).
12. 1 Bottle Dettol Antiseptic 56 ml.
13. 1 Tube Eye Ointment of Sulphacetamide Preparation
14. 1 Loose Woven Gauze (24" x 8") in a compressed pack.
15. 1 Bottle Aspirin (300 mg) 24 Tablets.
16. 1 Tear off Scribbling Pad with a pencil in Plastic Cover. (4" x 6")
17. 10 Adhesive Dressing Strips
18. 1 Record Card in Plastic Cover.
19. 2 Field Dressings of the modified army pattern.
20. One Torch medium size Eveready without cells.

Small First Aid Box
(5" x 3½" x 2½")
For Haversack & Pocket

CONTENTS

1. 1 Tube Cetavalon.
 2. 1 First Aid Dressing No. 2
 3. 1 First Aid Dressing No. 3
 4. 1 First Aid Dressing No. 4
 5. 1 Sterilised Medium Burn Dressing.
 6. 1 Spool Adhesive Plaster ½" x 1 yd. (1.25 cms x 90 cms)
 7. 1 Card of 6 Safety Pins.
 8. 1 Roller Bandage 1" (2.5 cms)
 9. 1 Roller Bandage 2" (5.0 cms)
 10. 1 Pkt. Cotton Wool.
 11. 1 Eye Pad. -
 12. 1 Small Scissors.
-

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